NEWSPAPER

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ACM '74

# Nine Sessions Set by SigBDP

SAN DIEGO – In contrast with previous Association for Computing Machinery (ACM) conferences, ACM '74 sessions provided by the Special Interest Group for Business Data Processing (SigBDP) will highlight the meeting here Nov. 11-13.

In a program consisting of 13 tutorials and more than 50 additional meetings and panel discussions at the San Diego Convention Center and the Sheraton-Harbor Island Hotel, SigBDP will sponsor five sessions on programming languages and four on operation systems.

Monday sessions offered by SigBDP include a panel discussion on improving data base management systems performance and a tutorial on testing business systems.

Chaired by Ben Schneiderman of Indiana University, the panel will cover such topics as "Data Base Machines Used as Rear-End Processors," "High Level Aids for Data Management Systems Performance," "Performance Tuning in Data Base Systems," "When Are Pointer Arrays Better than Chains?" and "On the Selection of Secondary Indexes."

On Tuesday, the special interest group will host sessions on methods, language developments and structured programming for business DP. Led by Joe Earley of Coopers and Lybrand, an afternoon panel composed of four managerial level representatives from various organizations will explore user experiences with computer performance evaluation.

Evelyn C. McDonald of the U.S. Postal Service will chair a Wednesday session entitled "Data Entry, Future Tense" for SigBDP. Finally, a tutorial on project management on the same day will complete the interest group's offerings for ACM '74.

While highlighting the practical side of computer use, the conference will treat other concerns in sessions on computer-based conferencing and standards for user-oriented programs. The Special Interest Group for Computers and Society

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## On the Inside This Week

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### *Afips Chief Charges*

# Education 'Inadequate' for Business DP

By Edith Holmes
Of the CW Staff

TORONTO – "A formal education in computer science is not an adequate – nor even an appropriate – background for those who must design and install large-scale computer systems in business environments," George Glaser, president of the American Federation of Information Processing Societies, Inc. (Afips) told the 10th annual meeting and conference of the Interuniversity Communications Council (Educom) here recently.

Characterizing formal education and competence in the business world as "the odd couple," Glaser charged universities with part of the responsibility for this problem.

"The educational system is providing nicely for a body of competent computer researchers and teachers but has done little to provide for the needs of those who must apply computer technology, particularly in a business environment," he said.

But, he added, universities can also assist in closing the education-competence gap by turning out more "computer-oriented problem solvers."

Professional problem-solvers need to be trained to practice computing in addition to theorizing about it, he commented.

"Too many computer science departments are training cello players for a Fourth of July parade and, in my view, it's damned difficult to play a cello while walking down the middle of the street in the hot sun."

While Glaser acknowledged the benefits derived from curricula developed by schools and by societies like the Association for Computing Machinery (ACM), he said recommending additional, more practical courses "is not by itself a sufficient response to the need."

Computer scientists must work "to advance the science of computing so that others can apply it," he remarked. Professors in this field have an obligation "to tell the students graduating from their programs as computer scientists – and their prospective employers – that they are *not* being trained for work in industry," he said.

Glaser also charged that the instructors of computer science tend to be poorly equipped to prepare their students for the realities of business DP.

"Many university computer science departments," he said, "are staffed with teachers who have had little or no experience with the street fighting that their students would find in the world of tight budgets and onerous deadlines."

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# IBM, AT&T Plans Will 'Cage In' Communications Users: Biddle

By Ronald A. Frank
Of the CW Staff

QUEBEC CITY – The computer/communications strategy of IBM and AT&T in the next few years will put users "in a cage," according to A.G.W. Biddle, executive director of the Computer Industry Association.

Speaking last week at the 16th Annual Information Systems EDP Conference of the National Retail Merchants Association (NRMA), Biddle told the attending users "you will have one source of supply for worldwide business information systems in voice data, data banks [from] IBM and you will pay dearly."

*Additional NRMA conference coverage is on Pages 5 and 6.*

And "you will have one source of supply for residential phone service [from] AT&T and your costs will skyrocket.

"We have individually and collectively placed the central nervous system of our total economy in the hands of one company," he said in reference to IBM.

In the area of bundled service, Biddle predicted IBM's strategy for the computer/communications world of the 1980s will "encompass complete end-to-end control of the total business voice and data communications network

"It will include a telephone instrument on your desk, an IBM PBX, IBM terminals, IBM CPUs and IBM mass storage devices, all tied together by IBM satellite," Biddle said.

In satellite services, IBM, probably in collaboration with Comsat but alone if necessary, "expects to have a domestic

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# Instant Access Crime File Use Growing in Arrest Decisions

By Nancy French
Of the CW Staff

WASHINGTON, D.C. – Although state and local law enforcement officers tend to request criminal history information from the Federal Bureau of Investigation (FBI) or state criminal records bureaus after rather than before a person is arrested, these same officers are beginning to request a "rap sheet" before arrest if it is available quickly and if it is computerized, a recent study completed by the General Accounting Office (GAO) found.

"As more criminal history information is computerized law enforcement agencies will use it more for prearrest purposes," the study said.

The report, requested by the Senate Judiciary Committee's subcommittee on constitutional rights, showed 32.3% of the computerized criminal histories requested by local law enforcement agencies were used for prearrest purposes, compared to only 1.5% in the case of fingerprint records.

Only 47% were used for postarrest purposes, compared to 91.5% of fingerprint records.

The trend, according to the study, represents a subtle shift in attitude and habit. While over the years police officers

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# *Indiana Bank Avoids VS While Operating 3890*

By Don Leavitt
Of the CW Staff

INDIANAPOLIS – The second Model 3890 Document Processor to come off IBM's production line is up and running at Indiana National Bank (INB), but not quite the way IBM originally expected.

The new peripheral is a high-powered magnetic ink character recognition (Micr) reader/sorter that IBM intended for use with 370s operating in VS environments. INB has its 3890 attached to a 370/155 all right, but it's running under OS/MVT.

Such an implementation is significant to more than just bank-oriented users, noted INB's director of data processing, Thomas A. Spall, since it shows IBM's mandate that new devices should be available only under VS can be broken.

In fact, he added, the bank is looking to see if the 3890 can be used under the even more mundane, but still popular, DOS environment.

The coding changes required to let the "real" operating systems handle the new unit were "fairly straightforward for a systems group such as ours that is thoroughly familiar with the internals of OS," Spall said.

### Cooperative Vendor

But he also acknowledged a "cooperative attitude" on the part of IBM was important to the transition project. The vendor provided, for example, magnetic tapes of the VS coding from the program information department and microfiche of the operating system logic.

IBMers also answered any specific questions bank employees raised, though they did none of the actual recoding needed to move the 3890 to OS.

Bank spokesmen were quick to note that they expect to go to VS eventually and that Dynamic Address Translation (DAT) boxes are already on order for the two 155s the bank owns.

"Even though we've been successful in moving the 3890 to our existing environment," Spall said, "we now see a lot of potential in our situation for the 3850 honeycomb tape library device [CW, Oct. 16] and, yet, no easy transition."

INB made the effort to put the 3890 under OS primarily so it could switch back to its still-installed IBM 2956 Micr reader/sorters if it became necessary. Spall is devoted to making the new unit work, however, since it has been processing from 1,900 to 2,100 document/min. compared with the 1,100 to 1,600 document/min rate of the older gear.

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## Afips Releases Reference Text

# Revised Study Applies Job Descriptions

By Edith Holmes
Of the CW Staff

MONTVALE, N.J. – In a companion reference text to its *Computer Programmer Job Analysis* completed this summer [CW, July 10], the American Federation of Information Processing Societies, Inc. (Afips) explains not only what computer programmers are and what they do, but how these descriptions apply to actual job situations.

Including fewer research results and descriptions of methodology, this revised edition of the study emphasizes workable job descriptions for programmers and discusses their application to professional standards, DP management, career development and training and education, according to Afips.

While the authors of the reference text retained descriptions of the project, the research approaches used and the universal job descriptions created for business, scientific and engineering and systems programmers, they said they intended their revision as a means of making the initial report more accessible to managers, training directors and personnel people.

In addition to the "ideal" and "as-practiced" job descriptions definitions combined to form universal job descriptions in the original publication, the revised version of the Afips study includes specific focus and organizational job descriptions as well.

### Types of Descriptions

The study defines each type of job description as follows:

- Ideal: the description consisting of task and skill statements rated by experts in the computer industry as highly important to the programming job.
- As-practiced: the description including task and skill statements rated by active programmers in a national survey as containing moderate to high importance in their jobs.
- Universal: descriptions for business, scientific and engineering and systems programmers comprised of task and skill statements given moderate to high importance ratings in both the ideal and as-practiced job descriptions.
- Specific focus: descriptions defined by distinct lists of task and skill ratings developed for subgroups of programmers identified according to job title, programmer level, months of experience, amount of education, size of computer used, kind of computer and primary language.
- Organizational: descriptions specific to the philosophy, standards and equipment of a particular organization, especially useful to those organizations wishing to tailor a job description to its DP needs and traditional procedures.

### Applications

The *Computer Job Programmer Analysis/Reference Text* then takes these job descriptions and suggests areas where they might be applied. The universal job description, for example, could assist in developing certification standards and in administering, recruiting and evaluating personnel, the study said.

This universal look at computer programmer responsibilities and skills might also help formulate career paths and should be taken into consideration when devising a training curriculum, the text added.

Similarly, the ideal job description could help meet the needs of certification, productivity improvement, career pathing and training programs.

In addition to aiding the definition of accreditation and licensing standards for computer programmers, the as-practiced description could assist in the legislation of professional standards and in guiding and evaluating personnel, the study indicated.

The report also suggested specific focus definitions of the programmer's job be used in all aspects of DP management, in career development and in training and education, as well as in accreditation.

Organizational descriptions are designed primarily for use in career counseling and in directing, recruiting and evaluating personnel for a particular company.

### Put Into Practice

The study noted that when the report was being written, two organizations had used task lists developed in Afips' research to determine their own descriptions, in one case for business and systems programmers and in the second for scientific programmers. "The special purpose in both instances was to establish a basis for evaluating on-board programmers," the text explained.

Copies of the 195-page reference book are available at $10 each from Afips Press, 210 Summit Ave., 07645.

# Education Inadequate For Business DPers

(Continued from Page 1)

He urged teachers to gain whatever experience they can by spending time working outside the university. While recognizing "it would not be a simple matter to arrange for individuals to move freely between the academic environment and the industry environment," Glaser commented "perhaps we should try to make it so."

Computer science graduates should also have received training in areas other than, but related to, computers, he remarked. "A graduate with a basic understanding of industrial problems, whether acquired in an engineering program or in a business administration program, and who, in addition, has an understanding of computers and their limitations could be a most useful employee."

While he listed attempts by Afips and other societies to increase competence in computing through job descriptions, self-assessment and certification programs and manuals detailing design practices, Glaser concluded "the universities must teach the fundamentals."

And the universities "are our only hope," in Glaser's view, even though, "I am not satisfied that the significance of the problem is fully appreciated in academic circles or that those who are in a position to take the necessary steps to solve it are prepared to do so."

# Instant Access Crime Files Used More Often in Arrest Decisions

(Continued from Page 1)

routinely have used rap sheets in prearrest situations (to find out what a suspect looks like, for example, if he has a record of carrying a gun), they have relied on local files "because most crime is committed by local people . . . on whom the agency has a current criminal history file . . . [and] it takes too long to receive information from state or FBI files."

More than half of the requesting agencies reported it takes about two weeks to get a fingerprint record from FBI or state files, thus limiting its use for prearrest purposes.

In the case of the computerized criminal histories, however, 34.9% of requesting agencies reported a response could be obtained in less than an hour, and 23.8% reported a response took little more than one day but much less than a week.

Such records could be obtained more readily before an arrest was made.

### Requests Quadrupled

The number of requests from the Computerized Criminal History (CCH) system's files had quadrupled since 1972, the report showed.

In 1972 about 141,000 records were requested. Calendar year 1973 data revealed that CCH transactions had increased to 323,000. By June 1974, 226,000 CCH transactions had been counted and the report estimated that 450,000 transactions will have been made by the end of this calendar year.

While a majority of the requesting agencies did not consider a two-week response time for an FBI fingerprint report too long, the report speculated that criminal justice agencies have merely adjusted their operations to the system and do not consider it necessary to have criminal histories sooner than they normally receive it.

### Improvement Possible

But, the report said, police officers are learning that as they receive this information "by computer" and receive the information "sooner," "their operations can be improved.

"Computerized criminal history data could affect the way criminal justice agencies view and use such data," the report stated.

The findings are being interpreted by some CCH critics as a warning that computerized criminal history records warrant more strictly enforced access and privacy rules.

"Their mere existence invites access in cases where there's a doubt as to whether an individual should be arrested. The suspect with the record is far more likely to be picked up," one critic said.

The GAO also discovered sloppy dissemination practices in the states sampled. In Florida, for example, 13 criminal justice agencies either allowed unauthorized access to the files or furnished criminal history data to agencies not authorized to receive it.

In Massachusetts, 10% of criminal history requests came from persons over the telephone who later could not be identified. This indicated, the report said, that the department's procedures for answering telephone requests were inadequate.

Correspondence with officials in both Florida and Massachusetts indicate they have taken action to correct these problems.

### Random Samples

The study was based on random samples taken of criminal justice agency requests made to the FBI, the California, Florida and Massachusetts state criminal records bureaus and on discussions with federal, state and local criminal justice officials.

Requests to the FBI fingerprint file and to the state bureaus were sampled during a one-week period.

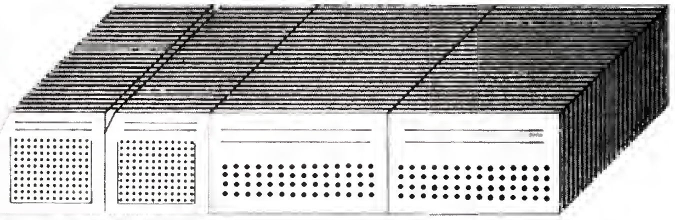
The CCH requests were sampled over an eight-week period since the system is so new that one week's requests would have provided too small a sample, the study said.

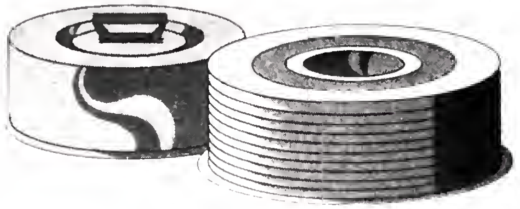
Requests to CCH in the eight-week period totaled 1,564, while one week's requests for FBI fingerprint records totaled 12,931.

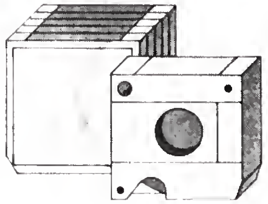
The report noted the CCH system has data on only about 2% of the 21 million individuals on whom the FBI has criminal history information.

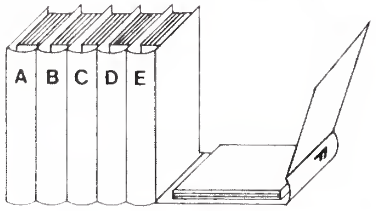
The Justice Department pointed out that while criminal histories from only four states are held in the CCH system, 44 states use CCH file materials.

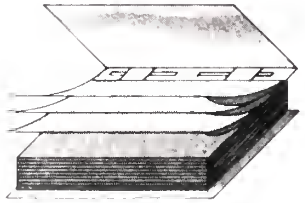
# Tab makes one storage cabinet for cards, one for disks, one for microform, one for binders, one for printouts, and one for tapes.

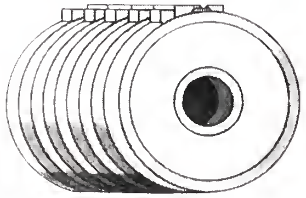


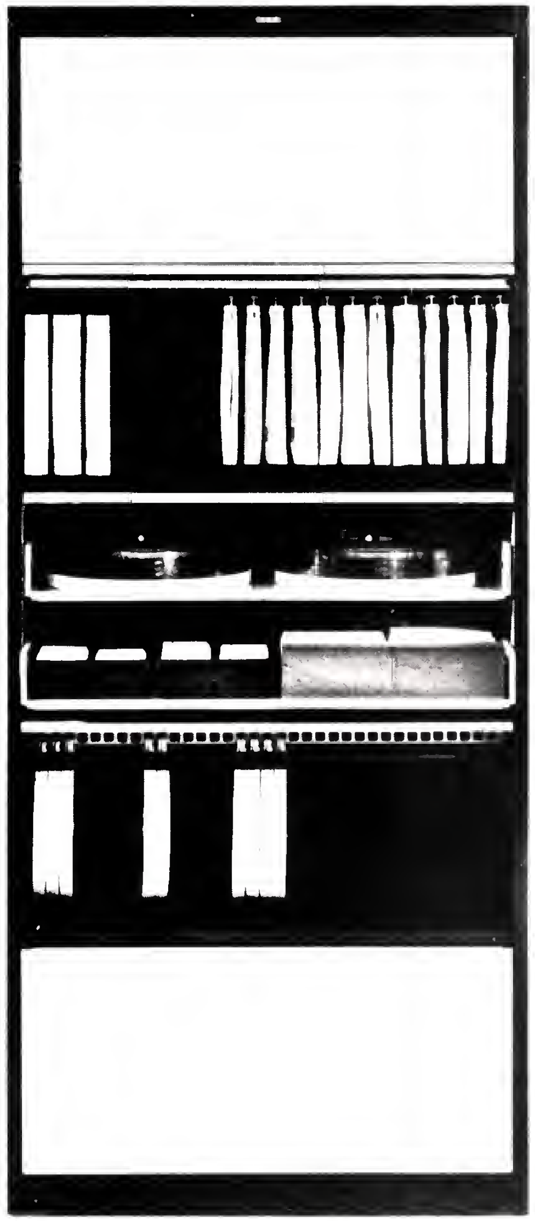












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# Biddle Says IBM, AT&T Strategy Will 'Cage In' Users.

(Continued from Page 1)

satellite system operational within three or four years. Geared to government and business customers, it will be an integrated digital system with high-speed data, voice and image capabilities."

Unlike today's systems, Biddle continued, "it will not depend upon large ground stations connected to the user through AT&T local loops. Rather, the system, operating in the X band, will utilize a multitude of customer-dedicated antennae and only a few general-use ground stations."

IBM will probably soon start marketing its 3750 electronic switching system in the U.S., Biddle predicted. A "sophisticated PABX," the 3750 has been optimized for data switching but also has all of the features required in an integrated communication system, including "direct dialing, tie lines, data access, signalling, 60-cycle power, call directors, satellite connection and automatic over flow routing," he told the conference.

Initially targeted at the larger user, where IBM has more than 65% of the computers, IBM's project Carnation is expected to contribute $5 billion in revenues and over $1 billion in profit over the first five years of the program, Biddle noted.

The elements of IBM's overall strategy are now apparent, Biddle claimed. They include:

- Future Systems (FS). The fourth generation of computers will employ up to four parallel processors, mass storage and will probably be field-expansible.

A significant amount of maintenance will be performed by the user, Biddle predicted.

- System Q. A software system utilizing both conventional software and firmware. The system may be designed so that resource usage can be metered and the customer charged, he commented.
- Custom Terminals. Biddle said these would be a "family of unique, application-oriented terminals using extensive microcoding, new IBM de facto standard protocols and midlife enhancements."
- Bundled Pricing. The opportunities to offer full end-to-end service will allow IBM to bundle prices once more . . . [and] freeze out any significant competition that might develop."
- Data Security. In order to solve the data privacy-security problem, Biddle said, automatic encryption will probably be an integral part of each element of the system.

There will be relatively few "foreign or competitive devices" in the system, Biddle warned. IBM will not disclose communication protocols or electrical, mechanical and logical interfaces until "well after the market is locked up."

In addition, scrambling and encryption techniques will be utilized "as an umbrella" over the entire end-to-end system, he said.

### Four Lock-Out Procedures

Switching to the Bell System, Biddle said "AT&T has retained its absolute monopoly power over the communications market for more than 90 years through four relatively simple lock-out techniques."

First, he explained, it was able to monopolize the local exchange market when it obtained a "patent monopoly on Mr. Bell's invention."

By interconnecting its companies with long lines and refusing to interconnect non-Bell companies, it killed off competition, he claimed.

By controlling all system architecture and by producing all of the equipment used in the system, he continued, it was able to prevent the development of industry standard interfaces and thus block interconnection.

Lastly, by "manipulating the weak and unsophisticated Federal Communications Commission" it was able to "cast [its] anticompetitive practices into bronze in the tariffs," he said.

"You and NRMA have made a major contribution in the growing resistance to the misuse of AT&T's monopoly power," Biddle told the attendees. "Ma Bell is in trouble. People finally have realized . . . the customer should be able to choose any properly certified terminal he wants on the end of that pair of wires."

Local operating companies should be able to procure long-line service from anyone at the lowest possible cost, Biddle said, and operating companies should be free to purchase the equipment they use in "open and competitive markets."

But, Biddle predicted, "IBM is going to bail them out.

"After all, how could a poor little old restructured Ma Bell compete with a giant monopoly like IBM?"

Perhaps of greater significance, Biddle said, IBM will "get the MCIs, Datrans, Western Unions and other 'cut-throat' competitors out of Ma Bell's hair and they can compete like proper gentlemen – at their accustomed 25% pretax net and controlled 14% per year rate of growth."

## 'The Time Has Come to Stand and Fight'

QUEBEC CITY – Users may be the major group able to fight the potential monopolization of the computer and communications business by IBM and AT&T, A.G.W. Biddle, executive director of the Computer Industry Association, told NRMA attendees last week.

"The time has come to stand and fight on both fronts – computers and communications," he said.

It's time you, the user, told your suppliers to grow up and put their childish games aside.

"It's time you told the FCC, AT&T and IBM that all interfaces, codes and protocols be fully disclosed – both hardware and software – and must be disclosed early enough to allow you to choose between the compatible and competitive offerings of at least three vendors or you won't play.

"You should insist that all elements of a product or service offering be separately priced," he said.

Users should ask the FCC to require "all equipment purchased for use in the nation's communications system, be it local service, terrestrial or satellite, be procured on an open, competitive bid basis. Furthermore, there should be no joint or bundled marketing efforts between CML, IBM and AT&T operating companies or Western Electric.

"All transactions should be at arm's length," Biddle indicated.

"No strategies intended to lock you, the user, into a sole-source system should be tolerated nor should anticompetitive and exclusionary tactics be permitted," he stated.

"Do these things and someday ye shall be free – free to choose what's best for you and your company – not just what's best for AT&T and IBM's profit and loss statements," Biddle concluded.

"I/O SYSTEMS '74"

Plan now to attend "I/O Systems '74," a three-day seminar exploring the role of input/output systems in the future data processing environment.

Sponsored by the Input/Output Systems Association, "I/O Systems '74" will be held on November 13-15, 1974 in New York City at the City Squire Motor Inn.

Thirteen sessions will zero in on:

- Electronic Fund Transfer Systems
- Cash Dispensing Equipment
- Teleprocessing
- Terminal Systems
- Direct Data Entry: Key to Disc & Tape
- Minicomputers/Microprocessors
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- DP Card Equipment
- EDP Printers
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Keep pace with the info. explosion. Register now! The registration fee is $150, or $50.00 per day. Contact V. Tulip, Input/Output Systems Association, P.O Box 1333, Stamford, Conn. 06901, Phone (203) 323-3143.

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# Bank in Indiana Avoids Running Document Processor Under VS

(Continued from Page 1)

He stressed the "hard dollar" justification of the move to the new equipment. The cost of the new peripherals (another is still on order for delivery late this year) and their operators comes to less than the cost of the present and future 2956s, their operators and the miscellaneous equipment and operators INB would need to duplicate all the functions built into the 3890 and the volume of documents they can handle.

### 'Considerable Parallelism'

Software manager William D. Beal tended to play down his group's efforts, estimating that it required no more than "about 33 man-days" to make all the changes. There is "considerable parallelism," he said, between the OS handling of the older 1419 and 2956 Micr reader/sorters and OS/VS1's management of the 3890.

There are, however, a number of capabilities that are completely new with the 3890, such as one- or two-side microfilming of documents as they move through the transport mechanism. Happily the IBM coding for these features is well documented and could be moved to OS "fairly easily," Beal said.

The ability to program the CPU built into the 3890, through a macro processor in the 370, also posed some problems "but nothing we couldn't solve." The 3890 CPU controls the fine-sorting operations of the unit "so operators don't have to fiddle with switch settings," Beal explained.

INB has come a long way in a short time. Until it received its first 370/155 in early 1973, it was a multivendor operation with Burroughs B3500s installed for Micr processing and Univac Series 70/45s in place for batch processing.

The 155s each had 1M of main memory then and one is currently being expanded to 1.5M. The bank also has 18 tape drives – mostly 3420 Model Vs using 1,600 bit/in. densities – and 20 Model 3330 disk spindles, including two for 3330-11 double-density packs.

Three 3211 and two 1401 N1 line printers are also in the shared Hasp configuration.

A growing network of remote terminals will include, by year's end, 100 Sanders 720 and IBM 3270 CRT-based devices operating under Cics but using Total's access method. The bank also has an IBM 7770 audio response unit in place capable of reacting to 24 simultaneous inquiries.

Both Beal and Spall noted that INB also houses a Digital Equipment Corp. PDP-11 based switching and capturing system for Bankamericard credit authorization operations.

# SigBDP To Provide ACM '74 Sessions

(Continued from Page 1)

(Sigcas) will also sponsor a forum on computers and public policy.

Opening Monday morning with addresses by ACM president Jean Sammet, keynoter Robert S. Barton of Burroughs Corp., and the A.M. Turing Lecture by Turing Award Winner Donald E. Knuth, the conference will host the annual U.S. Computer Chess Championship Tournament.

The full conference schedule, registration and hotel information may be obtained from Lyn Swan, ACM '74, P.O. Box 9366, 92109.

### But Speaker Says It's Happening

# POS-EFTS Tie-In Not Yet Economically Justifiable

By Ronald A. Frank

Of the CW Staff

QUEBEC CITY – Although banks may want to install their terminals next to retail point-of-sale (POS) terminals, the economics will not justify such an approach, according to James Douras, treasurer of the Chargex Card Association in Detroit.

Speaking at an NRMA session dealing with the possible tie-in of electronics funds transfer systems (EFTS) with POS, Douras said data from bank terminal tests show that a volume of over 500 transaction/mo are required to justify such an installation.

Actual volumes average only 150 per month, he added.

Retailers and banks each have terminal networks with divergent views and a tie-in between the POS and EFTS systems "is not clear," he said.

Banks are concerned with such items as descriptive statements on bank accounts, electronic clearing of checks between banks, manned teller terminals, preauthorized entries for utilities and insurance payments and payrolls and authorization systems to control check and bank card exposure.

In contrast, Douras told the session's attendees, retailers are concerned with the total management of their business with POS primarily through inventory and sales information and secondarily through credit control of the retailer's credit card. And these functions are not usually considered by EFTS systems.

### Tie-Ins Have Occurred

Despite the differences, some limited tie-ins between EFTS and POS have occurred. Bank cards are the most evident, with over one million retail outlets accepting these credit cards, Douras said. For many retailers up to one-half of the sales volume is purchased with bank cards.

These cards are also finding acceptance in supermarkets and other stores, he added.

In a national trend, major retailers are selling their credit card receivables to banks. This is done in a way that the merchant retains the identity on the card and billing, but it frees up working capital for the retailer, Douras said.

Further interfacing with bank systems and POS will allow retailers to achieve economies of scale "not available from single store systems," he said. Banks have lowered costs through multibank processing at one center.

### 'No-Risk' Transactions

When the Master Charge and Bankamericard on-line nets are tied into POS they will provide the retailer with the ability to accept credit transactions "from 40 million out-of-town shoppers at no risk," he said.

Douras predicted that both charge plans will announce national debit cards soon through local banks.

In order for the banker/retailer interface to evolve, EFTS nets will have to support multiple types of POS terminals and allow interface with retailers at the central CPU level. EFTS nets will have to capture store data as well as bank data, he added.

This type of large-scale interfacing will achieve a higher utilization of phone lines than is now possible with single company systems, he estimated. The two industries will interface "on a mutually beneficial basis," he concluded.

### Disagreement

Taking issue with Douras' comments, Roger Hancock, payment systems consultant at Irving Trust Co., told the session that progress in the EFTS area was being hampered by the studies now underway in Congress and before different government agencies.

In various ways, the EFTS question is being affected by the Federal Reserve, Federal Home Loan Bank Board, Justice Department, controller of the currency, the Congress and individual state agencies and they are all trying to lend direction to a very complex situation, Hancock said.

CW at NRMA

"Before we finish, the Federal Communications Commission, Federal Trade Commission and the Department of Health, Education and Welfare will get involved," he said, adding as long as they persist EFTS will be of insignificant national consequence.

"We don't believe that the consumer will accept the bank card as the means under which EFTS will come about," David Phillips, vice-president of First National City Bank, told the attendees.

### No Belief in EFTS

"We don't believe in EFTS but we believe that there is an opportunity to apply systems that will solve both retailer and consumer problems."

He described the 5,000 terminals installed in 2,000 retail outlets in the New York area. The bank's customers use debit cards on this network at the rate of 150,000 transaction/day for checking accounts. The system also handles 25,000 credit authorizations daily.

This system is a base for future ways to serve both consumers and retailers, Phillips said.

# 'UFOs' Predicted To Occur in Russia

CHICAGO – UFO sightings, like history, seem to repeat themselves, a psychologist at the University of Chicago has found after an eight-year study.

UFO "activities" reach a peak every 61 months and follow a definite geographical pattern, according to Dr. F. Davis Saunders.

Saunders fed details of 50,000 UFO sightings into a computer at the University of Colorado and found a distinct pattern of peak activity every five years and one month, each time moving across the globe from west to east in jumps of 1,500 to 2,000 miles.

"Judging from this pattern and the results from the computer, the next peak period of UFO sightings will occur about Christmas 1977, around the Aral Sea in southern Russia," he predicted.

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# Choice of OCR-A Result of Three Groups' Meetings

By Toni Wiseman

Of the CW Staff

QUEBEC CITY – Following an opening panel announcing the acceptance of OCR-A Size 1 as the voluntary industry standard [CW, Oct. 29], attendees at the National Retail Merchants Association's (NRMA) 16th Annual Information Systems EDP Conference heard how the systems specifications working committees had developed that standard.

G.W. Wetzel, manager of marketing services at Recognition Equipment, Inc. and chairperson of the Character Set Definition Task Force, described the decision-making process his group went through.

According to Wetzel, the group knew that OCR-A was the accepted standard, that a limited set of characters would be required to identify functional requirements and the identifier codes would have to be relevant to data elements they represented.

The group followed recommendations by the chairman of the Ansi X3A1 committee that it use the OCR-A font, keep the subset as small as possible and eliminate critical pairs, such as B and 8, S and 5 and other characters easily misread, if possible.

OCR-A, Wetzel said, was chosen because there is more experience with OCR-A than any other font in the U.S. In addition, it has a proven record for few rejects and misreads over a large variety of documents and print quality variations.

The final character set includes 25 symbols: the numbers 0 through 9, letters R, P, C, M, N, X, D, U, A and Y and four special characters.

In addition, the NRMA committee determined that the function code would always be in the left-most character position, filler codes would be placed right of the function code (except in price fields), periods would be used in price fields only and field-modify characters would not be used in price fields or universal vendor marking.

Murray Coker, manager of retail marking systems for Monarch Marking Systems and chairperson of the Media and Printing Specification Task Force, discussed the aspects of the optical and dimensional characteristics of the media and the location of the characters on the media.

## CW at NRMA

His committee decided on two print quality tolerance ranges – range X, which is high-quality printing, and range Y, which is medium-quality.

It further stated that all printing devices should be capable of producing printing at the X level, while scanning equipment should be able to read printer images at the Y level.

This, Coker said, was because of the possibility of quality deterioration between the printing and scanning operations.

A number of factors were considered in the case of character positioning. The clear area and margins (top and bottom, left and right) had to be carefully evaluated because of the human factors involved in scanning with hand-held wands. Wand scanning depends on people to direct the wand and also involves variable velocities of scanning, Coker pointed out.

Additional considerations included line separation, line spacing, character skew, separation and spacing, adjacent character misalignment and character misalignment in a line.

Spectral requirements were also considered, Coker said. Two banks were specified, one at the high end of the visible range and one in the infrared range.

"All printed media must meet spectral requirements in both ranges, to provide for broader use of reading technologies," he said.

Finally a standard for media opacity was established, since high opacity may be required to compensate for show-through in certain applications such as overlays, he said.

### Data Formatting

The work of the Data Formatting Requirements Task Force was discussed by chairperson James McKenna, program manager for retail products systems development at NCR.

The committee established specific rules such as length and placing of fields for universal vendor marking and general rules for in-store formats to allow for user variations.

Of prime concern were the ticket size, length of scan line and compatibility with past, current and future technology.

The final recommendations of this task force were that the fields be identified by a single character, field length be fixed and the density of spacing be variable due to the differences between printers.

The vertical ticket format was decided upon, McKenna noted, because of several advantages including the convenience of hanging tickets and the fact that the longest scanning line is only 10 characters, thus reducing the possibility of the tellers' hand wavering in the wanding.

# Workers' Badges Monitored

SUNNYVALE, Calif. – The Radiation Detection Co. here is using a computer to keep track of radiation absorbed by scientific and medical workers throughout the United States. An IBM System 3/Model 10 keeps records of the badges employees of hospitals, universities and laboratories are required to wear, warning them before their exposure reaches the danger level.

Badges are collected on a monthly basis and the exposed film they contain is read for the type of radiation, its source and the degree of exposure. The information on each person is fed into the computer, giving an instant update of his total exposure on a quarterly, yearly and lifetime basis.

When an individual's reading exceeds the maximum dose allowed by federal health standards, his employer is immediately notified so steps can be taken to eliminate the danger.

# System Not Random Enough

LONGVIEW, Texas – Jury selection in Gregg County, which was computerized recently, has been improved to assure a more random system than was initially provided.

The original sequence of selection, which was established on the second letter of a voter registration name, did not prove satisfactory because the variance did not prove wide enough.

The change will result in a varied system insuring that the choice of jurors will be picked in a random order that will not permit duplication.

The new selection system will be based on the use of the third digit of a voter registration number and other alternates.

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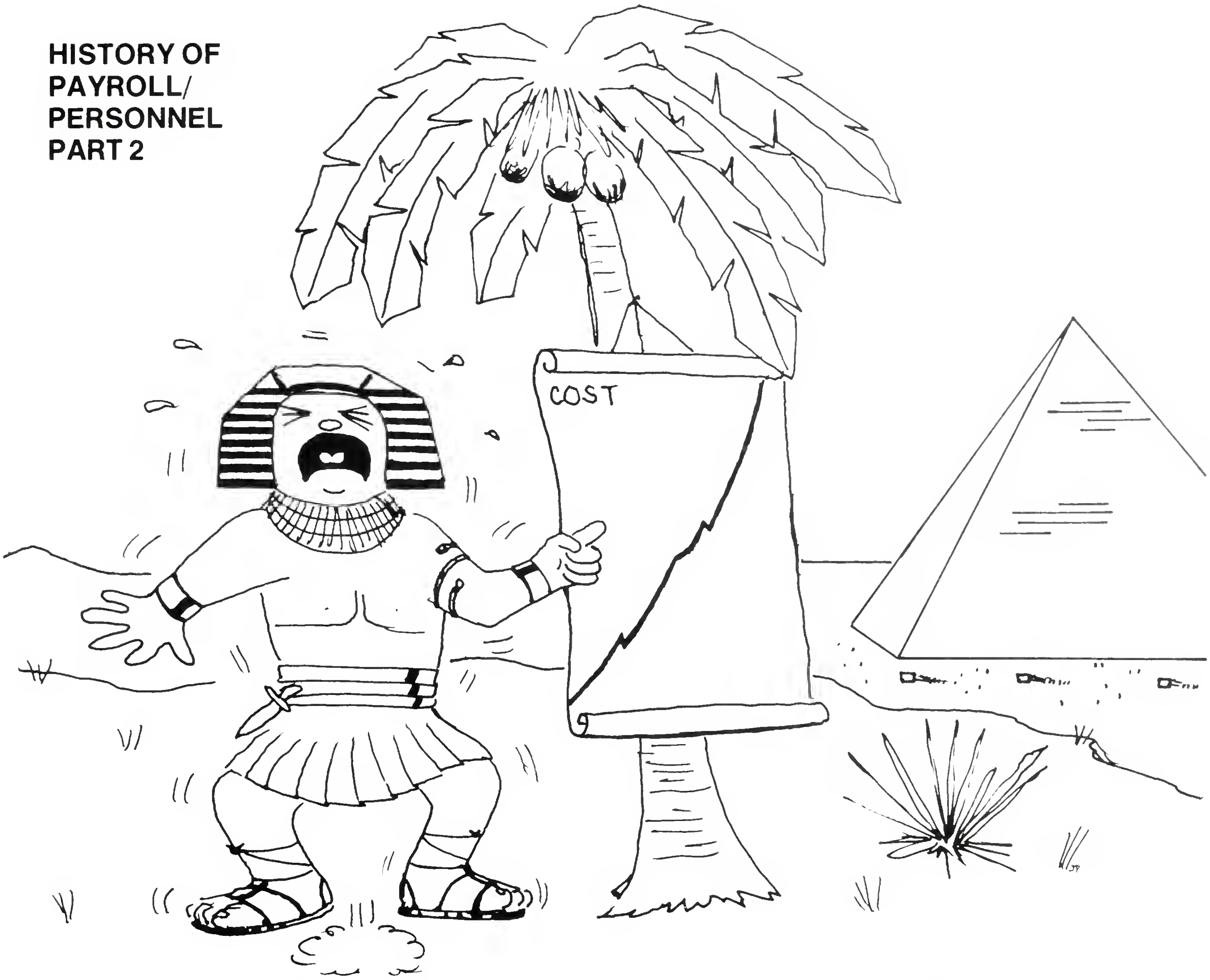

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### *Yields Clinical Health Profile*

# Hospital System Diagnoses 'Healthy' Outpatients' Ills

BALTIMORE – Computers at the U.S. Public Health Service Hospital here work to detect disease before illness becomes apparent to patients and causes them to seek medical aid.

Using three Control Data Corp. CDC 1700s, Dr. Richard K.C. Hsieh and his Health Services research staff screen hospital outpatients to discover and recommend people for treatment when their exams show signs of the beginnings of a serious disease.

### Builds Bank

Operating out of the Health Evaluation Center (HEC), the project has also been designed to build a bank of "statistically useful" information which may lead to the treatment and care of patients who already have a serious disease, Hsieh said.

Working from machine-readable reports of medical histories and preliminary test results, "automated multiphasic health testing" yields a clinical health profile of individuals for physician use, he explained. The system receives information via the CDC 915 optical page reader and stores it on magnetic tape.

The summary report generated by the system includes demographic information and tests requiring physician attention. Hsieh noted "out-of-range" values are designated by astericks, and acute situations are signaled by bells attached to a teletype which prints out a message to the physician.

Using the computer-generated test result guide, the physician then examines the patient, notes problem areas and develops a plan for meeting patient needs, he commented.

### Integrates Notes

All information resulting from the tests and treatment by the physician are finally entered through the optical page reader into a permanent patient file. Hsieh said the computerized outpatient medical record format integrates physician notes from several visits on a single page for quick future reference.

Begun in 1970, the program provides a system whereby HEC minimizes time spent by its personnel and maximizes its use of automated equipment, Hsieh remarked. An easily recallable data base is intended to make diagnosis and treatment of illnesses more rapid.

A similar health maintenance system is used by the American Health Corporation (AHC) in New York. Owned by a consortium of seven companies, including Control Data Corp., AHC has also developed a multiphasic testing facility which uses computers to generate health profiles for physicians, a CDC spokesman said.

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# SSA Helps Diggers Analyze Artifacts With Contribution

ELLICOTT CITY, Md. – The Social Security Administration (SSA) here is getting involved in the nation's bicentennial celebration by giving computer assistance to an archeological project undertaken by Catonsville Community College.

The SSA is planning to supply a "minimal amount" of computer time for programs analyzing artifacts unearthed by the college's diggers at an old B&O railroad station here.

### Actual Time Small

Actual computer time will be very small and most of the work will be in programming the computer to eliminate the nonvaluable artifacts.

Once this is achieved, the computer will analyze the objects to determine, for example, if an indigenous culture produced them or if they were deposited in the area from some other source.

# *SCDP Offers Exam Aids For CDP Preparation*

HUDSON, Mass. – The Society of Certified Data Processors (SCDP) is offering review tests and full candidate assistance programs to aid people preparing for the Certificate of Data Processing (CDP) exam.

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# Bank's On-Line System Holds Interest for Clients

By a CW Staff Writer

CLEVELAND – Competition among banks has spurred the Broadview Savings and Loan Company, the largest such institution in Ohio, to install "instant interest" at each of its 18 branch offices.

Instead of waiting for the quarterly interest posting period, customers can quickly see their available balance with up-to-date interest declared.

According to William Halliday, vice-president of data processing, all of Broadview's 110,000 regular savings accounts, Christmas Club and Certificates of Deposit have been converted to "Quickview" accounts processed through an on-line computer network.

Teller terminals at service windows are linked by telephone lines directly with Broadview's control computer, an IBM 370/145, here.

Both passbook and no-book transactions are put through to the computer by the terminal. The 370/145 then updates the account balance and transaction history records and prints the entries on the customer's passbook or no-book documents inserted in the terminal.

The bank's IBM 370/145, via the terminals, will update the account master records of these customers.

"Quickview has proved popular and the transactions, which are processed as they occur, often exceed 5,000 a day," said Halliday.

"The benefits to the customer under such a system are numerous," John E. Rupert, president of the Broadview Savings and Loan Company, added. "Besides the obvious advantage of knowing the exact balance, the long wait at the teller window during the quarterly interest posting period is a phenomenon of the past.

"The customer can have instant updating on demand, simply by visiting one of our branches and asking the teller for an update," he said.

The on-line system has enabled each branch to handle larger volumes of business, without increasing personnel or decreasing the level of service to customers, he explained.

In addition to more than 50 installed teller terminals, the computer-based system has 30 IBM 3270 CRT terminals to maintain and update the master account records or for data retrieval.

The master file contains the records for more than 175,000 individual customer accounts. The 3270 operator can check the data being entered on the CRT and correct any errors.

Terminal entry is faster and more economical, and the new data that is entered becomes instantly available for use.

The system verifies account number and transaction code, and checks the "reasonableness" of the dollar amount. It creates the transaction record and handles all other balancing and recording involved.

The master file records may be accessed by keying in the account number and inquiry code. Information such as customer name, address, current account balance, the date of the last account transaction and a 90-day account history or history of a mortgage loan will then appear.

Customer name is a new addition to the record file, according to Halliday. "A customer can be easily associated with all of his or her individual accounts and this creates a better total relationship with our organization," he said.

Another unusual record entry is the census tract number encompassing the customer's residence address. Useful for marketing information, data can be pulled together to pinpoint the number and type of customer accounts within a given area.

Management of Broadview Savings credit the Quickview account concept, along with fast window service and instant interest updating, for much of the more than $30 million increase in deposits last year, Rupert said.

Tellers at the bank enter the account number, transaction code and amount at the terminal's keyboard.

## A Handy Scapegoat

PORTLAND, Ore. – A computer became a convenient scapegoat for The Oregon Bank recently when it overcharged its customers by 3 cents per check.

Michael Danielson, a bank executive, told an area newspaper the overcharge was caused by "a bug in our computer system." But another executive, Paul Nordstrom, refuted that, saying, "That's only what we tell the public."

The error occurred when the bank's computer was programmed to raise the charge for each check from 12 cents to 15 cents. The bank, however, forgot to allow for checks written but not processed before the price hike.

Nordstrom claimed the bank planned to ignore the mistake until someone complained.

And someone did. The Oregon Student Public Interest Research Group, a consumer watchdog organization, became aware of the overcharge and demanded compensation for the overcharged customers, whose accounts will be credited for the overcharge.

The bank's clients will also receive an explanation with their next statement, presumably containing the "bugged computer" story.

Said Nordstrom: "Isn't it funny how we'd rather blame the computer than human error? The customer accepts that a lot easier."

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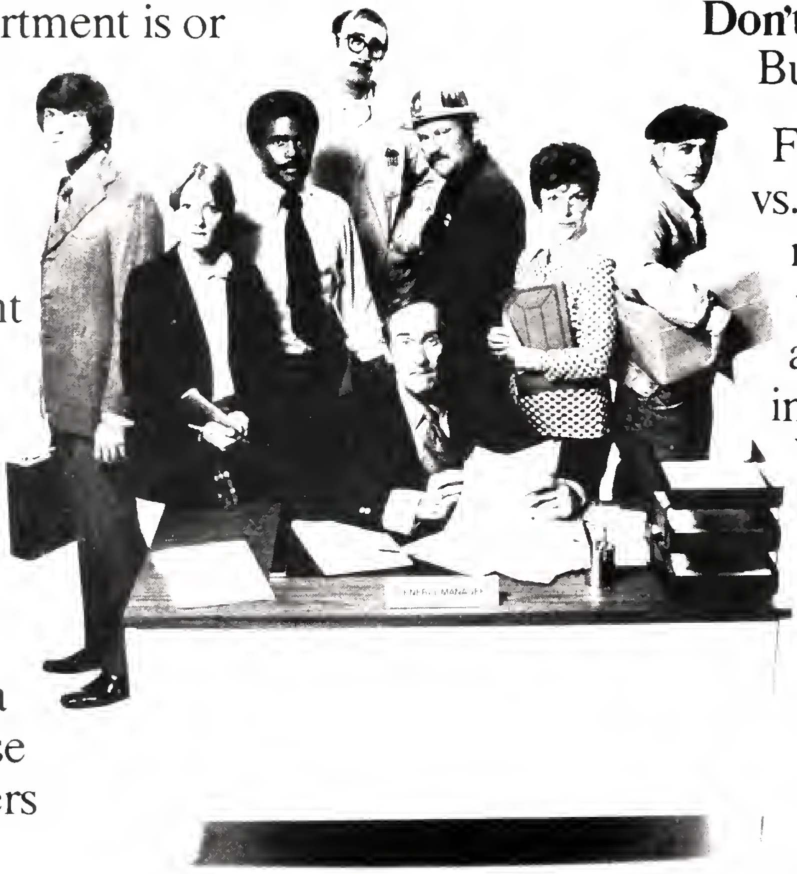

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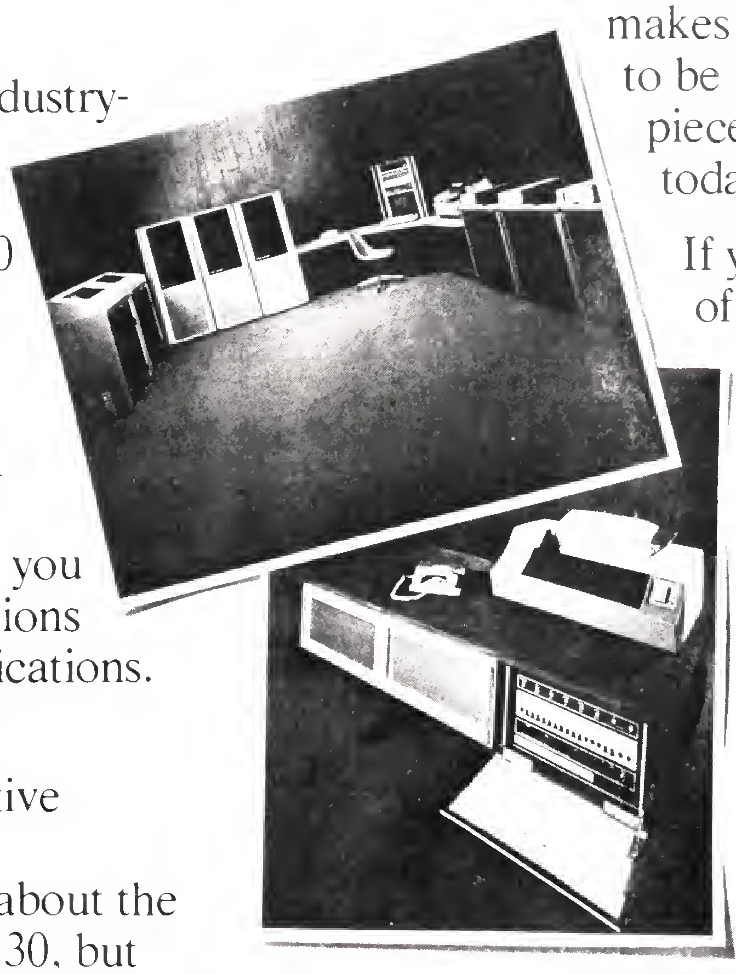

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# Editorials

## Privacy Board Essential

At least 10 issues will be awaiting discussion when the House privacy bill, H.R. 16373, comes to the floor following the election recess. But one amendment calling for the establishment of a federal privacy board deserves particular support.

Sponsored by Rep. Bella Abzug (D-N.Y.), the amendment would create a five-person commission, appointed by the President with the advice and consent of the Senate. Selected from outside of government, commission members would hire an executive director who, in turn, would choose a staff to assist federal agencies in devising and enforcing rules and regulations to implement the proposed privacy bill.

While the Senate's privacy bill, S. 3418, would institute a similar commission, this body would have no force of law over agencies and would be established for three years rather than permanently.

If a permanent board is not established to oversee the implementation of privacy regulations, adherence to privacy rules could become one of those tangential responsibilities agencies conveniently forget under the press of their particular duties.

In addition to providing a collection point for model guidelines and regulations and holding the power to investigate agencies which fail to comply with the bill's stipulations, the commission proposed by Abzug would also be able to conduct hearings on a broad range of privacy issues.

Though its primary responsibility would be toward the agencies, this board could conceivably act as a forum for airing the private sector's grievances and suggestions on privacy.

The computer community cannot afford to be without mechanisms like the privacy board for making its views known to Congress.

## Frightening Statistics

The apple-pie arguments that favor increased usage of computers by police and the FBI may be on the wane.

A recent General Accounting Office (GAO) study suggested that "false arrests could occur more and more often as police around the nation turn to computerized crime files."

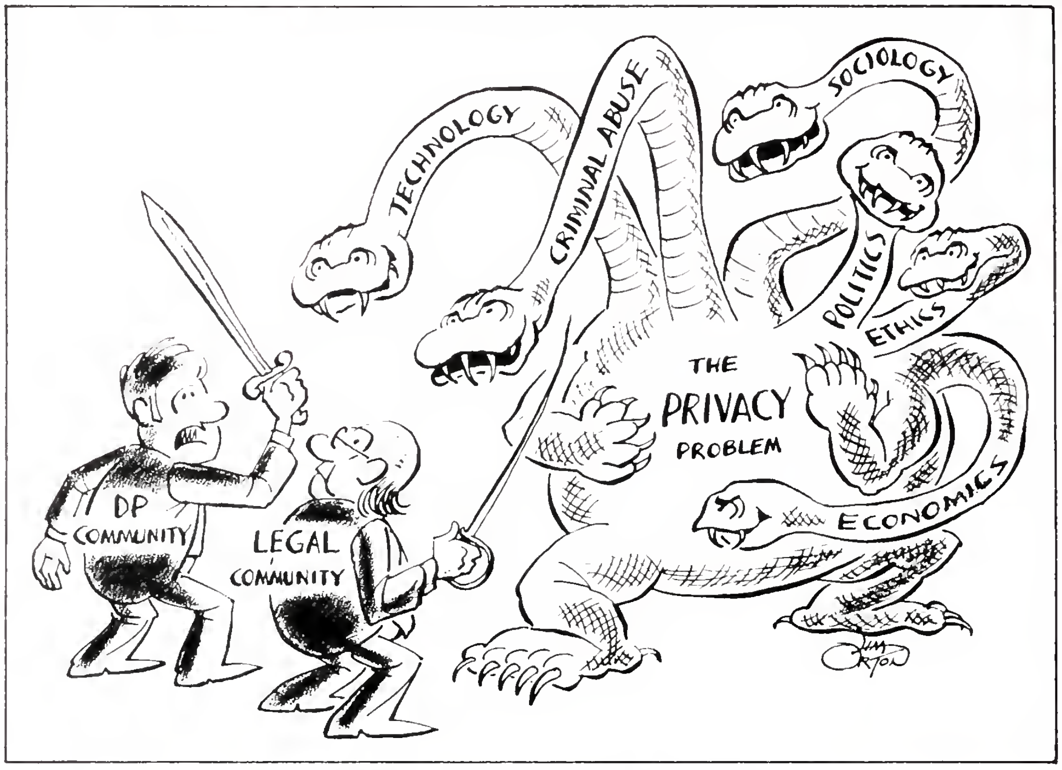
Whether the wane in the arguments for computerization will ever lead to the disestablishment of some of the most sophisticated networks in the country and to the dissolution of some crime systems remains to be seen. It's a far cry from disenchantment to a policy reversal, and in between there will be bureaucratic studies while citizens' rights continue to be violated.

The GAO report suggested the criminal history, arrest record or "rap sheet" file, because it is accessible through data communications technology rather than the mail in many cases, has been used by police officials in the actual decision to arrest a person.

The study, commissioned by Sen. Sam Ervin, said when arrest records were available only manually they were used before an arrest in less than 10% of the cases studied. But when the records became instantly available, i.e., when computers came into the act, these arrest records were used before an actual arrest in one-third of the cases.

And it is the rap sheet file that the FBI has acknowledged to be in greatest need of updating; estimates of incomplete or inaccurate files run as high as 50%, yet police increasingly use these half-correct records in deciding whether to make a subsequent arrest.

These statistics back up our earlier contention that it is time for the FBI's Computerized Criminal History (CCH) file to be thoroughly reexamined – and probably abandoned.



'It Seems to Be Getting Ahead of Us'

# Letters to the Editor

## Why Haven't Men Spoken Out Against Layla Advertisement?

Is it my imagination, or is it a fact that all the letters to the editor concerning ECI Software Corp.'s Layla advertisement have been from women? Am I going to be the only male who agrees with Julie Wilson [CW, Sept. 11] and Paula Berg [CW, Oct. 16] that the Layla ad was sexist and sexually suggestive?

I found ECI's ad offensive simply because of its blatent use of a sexual "hook" (the model's pose) and suggestive copy. I'll grant that the ad got my attention, but it certainly left a poor image of ECI in my mind. After all, if their product needs sex to sell it, it probably isn't worth further attention.

However, in response to Berg's letter, I have to say that I cannot support her denigration of the entire DP industry because she has always had to work harder, perform better, etc., in order to get "smaller" rewards than her male colleagues. My experience in this industry has shown that women are *generally* treated with equality. And where sexist attitudes prevail in management, I would urge women to demand equal treatment to the point of requesting assistance from federal or local equal employment enforcement agencies if needed.

It is people like Julie Wilson, speaking out against unjust, unequal treatment, who will perform a valuable service for all people, regardless of sex. Is it to her that I present congratulations for the fact that *Computerworld*'s Oct. 16 issue did not contain even one ad that I could interpret as sexually suggestive? Or should I thank a CW staffer? Or just chalk it off to good luck?

Louis Mills
Systems Programmer
California Cooperative Creamery
Petaluma, Calif.

## Crusade Against Virtual Memory May Be a Misdirected Effort

Donald Charity's analogy between the computer industry and the automobile industry [CW, Oct. 16] is one which I have used effectively for years because of the complexity, cost, lead time requirement, specialization, tooling and assembly disciplines which are basic to auto production.

To liken a computer system's series of programs and ancillary manual and control functions to an assembly line is a sure-fire method of getting across points relative to overall cost, cost of change, effect of change on schedules, need for total planning, economies of scale aand so on.

At a lower level, a comparison can be appropriately drawn between a single computer program and, let's say, the machine tool which produces the right front fender for your favorite car. This analogy is very useful in creating an awareness of the importance of early, diligent and continuous involvement by the user in establishing specifications.

The fender (program) will never really fit the car (operating procedure or system) unless total user understanding of what is needed can be captured by the programmer/analyst "tool and die maker."

The point of Charity's letter, as crystalized in his last paragraph, is true. As a matter of fact, he's given me one more area in which I can use the comparison: the inescapable and extant need for acquiring, through whatever means, top-level professionals, just like Detroit's.

A.K. McKechnie
Reuben H. Donnelley Corp.
Chicago

## UAW Considered the Competition And Put It in Endorsement

Howard F. Brenner of Baltimore suggests that the United Auto Workers' (UAW) policy on automation disregards the need for our nation to compete in worldwide markets [CW, Oct. 23].

To the contrary, our general endorsement of increasing productivity through automation and technology is based on that, among other important needs of our society.

The statement that "workers given the choice between unemployment with technology and full employment without technology would opt for economic survival" was only intended as a reasonably accurate prediction of worker reaction. However, governmental and industrial leaders would be well advised to take note of this caveat and work toward a set of conditions which will not require workers to make that choice.

Anthony W. Connole
Administrative Assistant
UAW
Detroit, Mich.

## Auto Comparison Apt

Herb Grosch's crusade against virtual memory systems is misdirected. He argues for the efficiencies of tailoring code to specific hardware-software environments.

As programmers our primary duty is to implement the best algorithm for a task in readable, easily debuggable code. The problems of hardware, compiler and operating system inefficiencies cannot be addressed within the context of application programs.

We can only recognize and accept adequate solutions to these problems without insisting on upward compatibility with previous errors. Only then will the suppliers of the current monstrously inefficient computing systems be willing to market systems with environments for the easy creation and efficient running of programs.

Richard J. Cichelli
American Newspaper Publishers
Association Research Institute
Easton, Pa.

# Dear Computerworld:

**I (borrowed) (stole) (shared) (copied) this issue of** *Computerworld*, and it made me

- ☐ PROUD
- ☐ SKEPTICAL
- ☐ ANGRY
- ☐ PLEASED
- ☐ INVOLVED
- ☐ AWARE

CURIOUS
EXCITED
DEMANDING
FURIOUS
INFORMED
SURPRISED

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12 VP Assistant VP
13 Treasurer/Controller/Finance Officer
21 Director Manager of Operation Planning Administrative Service
22 Director Manager Supervisor DP
23 Systems Manager Systems Analyst
31 Manager Supervisor Programming
32 Programmer Methods Analyst
41 Application Engineer
42 Other Engineering
51 Mfg Sales Representative
52 Other Sales/Marketing
60 Consultant
70 Lawyer/Accountant
80 Librarian/Educator/Student
90 Other

# Letters to the Editor

## Privacy Depends On Certification

Protection of privacy, system security for the benefit of the organization and individuals who have data about themselves in a computer system, adequate testing to insure accuracy of programming and provision for interactive intervention in the system when an error or exception does occur are *policy* decisions for a user organization. Fast-and-dirty systems (which lead to the errors which make headlines) usually violate one of these policies.

In the certification debate I started in July some readers still confuse technical knowledge with the responsibility of knowing how a computer is to be used and under what guidelines. The tone of some certificate in data processing (CDP) defenders implies that DP experts should dictate to management and/or users what a system will do and how a computer will be used.

An extensive edit and control subsystem may be a tremendous drain on available resources and all too often the technocrats avoid this merely by providing a set of hash totals here and there – and another major system is "on the air."

Certification doesn't offer the answer to these problems. A clear statement of responsibility for each of the following groups coupled with a written pledge to adhere to them would help:

- Suppliers of hardware, software and services dealing with overselling, continued support, bidding practices, etc.
- Users – dealing with the rights of those affected by their systems.
- Analysts and programmers requiring stated levels of testing and documentation, the experience levels and abilities required.
- Operations requirements for controls and security.

An employment ad, resume or proposal to sell which indicated subscription to a code of conduct would have a strong influence.

In his vitriolic attack on me (this is professional?) [CW, Sept. 25] Jens Christensen, misses the essential point that testing scheme limits the number of DP people who will ever be asked to agree to and support the code of ethics or conduct which is a part of the Data Processing Management Association's program.

Al Smith
South Bound Brook, N.J.

Letters to the Editor should be addressed to: Editor, Computerworld, 797 Washington St., Newton, Mass. 02160.

# A Highland Fling

Like most rich little poor boys, I've dreamed of being a jet-setter, of flying off to celebrate the millenium with the Shah, or having a poolside rendezvous with Rainier and Grace, or even just going to a mall dedication in Texas. And last week it happened: I went to Scotland for the weekend – repeat, for the weekend!

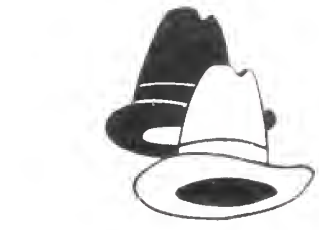
It began with friendships I have in Logica, one of the more powerful British software houses. I enjoy the personal style of the chairman, who is about as far away from Ross Perot as an executive can be. And I admire the prowess and pulchritude of his senior staff. Now, Logica has an annual company party, a combined informal business review and hoedown. The whole shop goes, top to bottom (except one pretty new receptionist whose young husband was excessively suspicious). They migrated this year to Gleneagles, the famous golfing hotel in Perthshire – by private train, no less.

I suppose the naked yearning that suffused my whiskered countenance on hearing this yarn was just too poignant. Anyhow, I was invited to be standup comic at the Saturday banquet, between the piping of the haggis and the opening of the roulette table. And later on, when they realized they couldn't keep me away with cattle prods, I also got put on an off-the-record panel on the European computer industry, with (among others) Jean-Pierre Brule of Honeywell Bull, Donald Davies of the National Physical Laboratory, Chris Layton of the Common Market administration, and Kenneth Baker, just reelected to Parliament three days before, who had been the minister over the Central Computer Agency when the Conservatives were in.

But the main pleasures were – the pleasures! There was a discotheque on the train, and two bar cars, and 14 cars of private rooms, two electric locomotives up front. We left Euston at midnight Friday, arrived at the Gleneagles siding early next morning, worked and played and ate and drank and danced and gambled and made new friendships until Sunday night, and then reversed the process. With disco!

Logica people from the Continent – they have, among others, a major contract with the Euro Space Research Organization – flew in to Edinburgh. And the PRC liaison officer stopped off from California. A real gathering of the clans!

British software artists work efficiently. They play efficiently, too. After all, everybody danced on the eve of Waterloo, didn't they? Ibn Saud looks tougher than Napoleon at the moment, and IBM FS tougher than either. But dance on, blithe spirits – and ask me again next year!



Herb Grosch

## He Doesn't Leave It to Chance...

# Integrated Systems: Taking a Lesson From Col. Sanders

Chicken can be served in many ways . . . it can be fried or baked, broiled or boiled, homemade or "store-bought." And it can vary in many ways.

Producing a controlled quality product involves reducing the variations and systematically removing the potential sources of error which can unpleasantly surprise either the chicken-eater or the chicken-seller.

### The Taylor Report

By

Alan Taylor, CDP

Foremost among the systems designers who realized this have been those with Colonel Sanders' Kentucky Fried Chicken. The words "Colonel Sanders' and "Kentucky" have come so much to define the standard of quality of chicken that anyone considering producing quality fried chicken today would probably start by considering the effect of changing parts of the Colonel's method rather than reinventing the method.

Users of integrated computer systems, however, still find unexpected surprises occur from time to time. There is no standard of quality of an integrated system to which they can appeal. Unlike the words "fried chicken," computer system descriptions do not deal with the content or with the method of preparation of data.

An integrated system essentially is simply something in which a file, or an input, or a report – originally used solely for function A, is now being used for function B as well!

The question of how the systems are integrated – like the question of how the chicken is fried – is important but often left almost to chance. Colonel Sanders would not leave answers to such questions to chance and, if we are to be as successful in quality control as he has been, we should not do so either.

Curiously enough, the first step in understanding just what we need to help bring computer applications up to Colonel Sanders' standards can be found in observing the operation in one of his shops. In my part of the country, at least they include a simple integrated data processing system which handles two functions for little more than the price of one.

The functions concerned are the cash register function and the sales analysis function. These are traditionally handled on the same machines, with separate sets of input rung up: the item and the price. Now these functions have been integrated, and only a single keystroke is needed to ring up both item and price.

Special keys are provided for each of the fairly restricted number of main meals available. Associated with each key is a register that counts the number of sales of each type of meal and also another programmable register that contains today's price for the meal, such as 88 cents on Wednesdays for the Fish Fry Special or 99 cents for the same meal on other days.

This is the point that makes it an integrated system – the use of the "sales analysis input" to provide the cash register input.

### Other Possible Methods

This is not the only technique that could be used to integrate sales analysis and cash register operations in Colonel Sanders. The method could be reversed, and the cash register input could be used to create the sales analysis input. It would work by associating a product code with particular sales prices, so that if 99 cents was rung up on Friday, an entry for one fish dinner would pass over to the sales analysis registers.

This could also properly describe an integrated sales analysis and cash register system, because it does intergrate the two functions. But such a system would not be the same integrated system as the one actually used anymore than producing fried chicken by other methods is the same as producing them in the Colonel's way.

The question is how to discriminate between the two systems which, on the surface, have the same functional descriptions.

Discrimination can be accomplished by noting the different types of errors which occur within the system and then seeing which integrated functions gets priority when things go wrong. In short, is the system a cash register system which will provide sales analysis functions as long as they don't interfere with the real work? Or is it a sales analysis system which as a by-product produces some potentially dirty input for a cash register operation?

This type of analysis is illustrated in figure 1 (see box). Two systems are compared according to the type of error that is implicit in the technique, and the function that is correctly handled when the choice between serving one function or the other has to be made is noted.

In this way we can differentiate between the two integrated systems in a productive manner. That is, we can see what set of precautions ought to be taken to insure the quality of the output of the selected system is as reliably constant as the quality of the food served.

| STEP NO. | QUESTION | SYSTEM A | SYSTEM B |
|---|---|---|---|
| 1 | What data is really being received from outside? | Sales Analysis data – a key representing a product sold is being pressed | Cash register data – a key representing the product price is being pressed |
| 2 | What data is being automatically created within the system? | Cash register data – the program-selected constant is rung up without operator action or control. | Sales analysis data – the program-selected product sales figures are incremented without operator action or control |
| 3 | When an error in the system occurs – i.e., the sales analysis and cash register functions are in disagreement, what happens? | The sales analysis accuracy is given precedence over the cash register accuracy. | The cash register accuracy is given precedence over the sales analysis accuracy |

Three steps are needed to classify integrated data systems in accordance with the priority accorded to maintaining the integrity of each system. The two cases illustrated above are based upon the Kentucky Fried Chicken application (see story above). System A can be called a sales analysis/cash register integrated system, indicating that sales analysis accuracy is given precedence over cash register accuracy, while System B would be termed a cash register/sales analysis integrated system.

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# Letters to the Editor

## Words Have Many Meanings Depending on Their Usage

I just completed reading the article by Alan Taylor in the Oct. 16 issue and my immediate reaction was, "What a waste of energy." Computers don't read indeed!

Taylor must be aware that two individuals communicating verbally or in writing may have two different interpretations of what is being said because language is an imprecise tool. Words such as "scan," "cycle" or "sight" suggested by Taylor have several definitions for general and specialized usages.

In many fields words are used to label actions or processes that have only very loose connection to generally accepted usage. If computer terminology serves its purpose within the limits set for it then there is no reason to quibble about semantics.

To imply that because of loose usage of the English language as related to computer operation we have misled management and have designed unreliable systems is the height of philosophical nonsense.

In refreshing contrast is the letter from F.J. Kurowski in the same issue in which he states in precise terms the responsibilities and tests which define a true professional.

Gustav G. Alexander
Director MIS

Equitable Bag Co., Inc.
Long Island City, N.Y.

## Who Pays for Downtime? We Don't Have a Prayer

In regard to the Sept. 18 Taylor Report "Who Pays for Downtime," I do not recall seeing any mention of other factors which affect systems performance, i.e., environment control, power supply, independent software, etc.

Before we can hold vendors accountable for their products, we would have to prove that all other factors have been adquately checked.

Obviously this could significantly increase data center costs if all shops had to install voltage regulators, transformers, humidity and temperature control monitors.

While it would be easy to point the finger at our computer supplier and tell him to fix the problem, in many cases we would and in fact have been caught with our "pants down."

While Alan Taylor's goals are admirable, it's not quite as simple as the article implies. Granted, in many cases computer manufacturers blow it, but in those cases where they don't, we in the data processing management profession would have to be able to weed out the other factors which have caused the system(s) to crash.

Until we can do this accurately, intelligently and consistently, we haven't a prayer in holding computer vendors accountable.

Roger A. Freeborn

Kitchener, Ont.

## Here Are Some More Ways To Turn Off a Programmer?

In reference to Paul Torell's Sept. 18 viewpoint, I have to agree with him in all but one point. Under number 7, he stated that full access to personal phones will make it easier for recruiters to call and be called. To many people, screening indicates distrust in employees.

If a manager takes care of the other points covered in the article, the programmers will take care of the recruiters. They won't have any reason to look elsewhere.

In it's place I would include the following items:

- Restrict all programmers to only one turnaround a day. Be sure to schedule all tests and compiles so that they will be returned to the programmers no earlier than 45 minutes before quitting time.
- Be sure to inform programmers that "no machine time" or poor turnaround is not a valid reason for missing deadlines. Be sure to point out that there is always time available on the midnight shift and on weekends.
- Be sure to count hardware problems as a turnaround. Don't try to rerun the job. Make the programmer resubmit it.
- Insist that everyone use the source library package but cut down turnarounds since in some cases it will require pack changes.

I wonder how many managers read the article and said, "That doesn't apply to my shop."

D.A. Marquardt
President

General Electronics
Lyons, Ill.

## Bouquets for Burroughs

In regard to Alan Taylor's column of Oct. 9, let me make a couple of points on Burroughs so that we can get an overview of its qualities as a vendor.

- Burroughs' architectural designers, in my opinion, consistently advance the state-of-the-art and remain steadily ahead of the field. Burroughs machines are specifically designed for the work they'll do, the most notable case being the Cobol-oriented Medium Systems instruction set.

Where up-time is crucial, the large systems can put a faulty processor off-line and transfer its programs to another without hesitation.

- Burroughs' system software is uncategorically the most advanced and comprehensive of which I know. Ideas currently being touted as new by other vendors have been around at Burroughs for years.
- Cobol on Burroughs is optimized, straightforward and complete.
- Burroughs' management leaves something to be desired, but in the cases I've seen, a user who knows how to deal effectively with situations in general can get a satisfactory response if he puts some effort into it.
- Improvements in the company's technical and engineering support would be desirable. However, savvy users can maintain a good, solid, powerful (in terms of cost/performance) computer operation.
- Most Burroughs users I've seen have been won over more or less permanently once on a Burroughs machine. Despite the company's hangups, the MCP, Cobol and pricing of the systems make a decisive difference when budget time comes around.

Having said this, let me state that I am an ex-Burroughs rep and that DPx Systems, at this point, has dealt only with Burroughs equipment. Even so, I feel the above comments are reasonable and accurate.

Roger Hoppe
President

DPx Systems
Arlington, Texas

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User Responsible

# Installing MRP: How to Do a One-Year Job in Six

By Glenn N. Graham

Special to Computerworld

Wells Manufacturing Corp. now has material requirements planning (MRP) up and running sufficiently well to say that it does, in fact, work. We can also say that this system is so far superior to anything we have had in the past, manual or computerized, that we would never wish to go back.

On the other hand, we will never have a system we consider perfect. We still have a list of improvements which could be made to MRP and I am sure that when this list is completed we will have learned enough to write another list.

This feeling can be compared to a man who just bought a six-in. telescope and can now see enough detail to want a larger telescope. As a practical matter, there must be some end to this, but vision is an element of control and we must see better than our competition.

Arriving at our present level of sophistication has not been easy. We have often asked ourselves why it took us 72 months to install MRP when it takes most other companies only a year. Anyone who wishes to match this "extraordinary" speed should follow our example.

Our operating rules were as follows:

- Don't waste time researching your system as it is obviously bad and would only confuse your thinking, otherwise you wouldn't be trying to change it.
- Don't try to flowchart the system you would like to have as no one is smart enough to do the whole thing. Go ahead with the individual small segments of your system and worry about trying to tie them all together at a later date.
- Don't spend a lot of time trying to find out what other people are doing. The joy of this whole system is doing it your own way. Go ahead and reinvent the wheel.
- Be sure your management people aren't wasting their valuable time involved in the design of this system. Some companies have gone so far as to organize a team but we chose to do it on an individual basis.

## Viewpoint

- Don't be afraid to get started. Order your computer now! Hire a programmer, give him an idea of what you want, stand back and let him go. Perhaps you should check back, now and again just to be sure he is on the right track but always remember that he's the expert who is going to solve all of your problems.
- Don't hold planning meetings on a regular basis. This only uses up valuable time and increases your installation costs. Meet only when someone has a big problem.
- Don't make the report users check the reports to make sure they are working. Let the programmer be responsible for their accuracy; after all, he designed them.

If you find that you don't agree with these rules, it will probably only take a year rather than 72 months to install MRP.

Actually, we're not sure whether it required 72 months, 84 months or 60 months. When we first began to work on this, the term "material requirements planning" was not in our vocabulary. However, "inventory control" was and our intention had always been to have a requirements planning program.

We followed the rules that we outlined previously because from the beginning the whole system seemed deceptively simple. The computer salesman was always very confident that the machine he was selling would do the job we were asking of it. The programmer was always confident that the system would work because the computer salesman was so confident.

It was several years and many thousands of dollars before we finally realized that we (the user, the manager, the programmer, etc.) were all hearing what we wanted to hear and happily waiting for the programmer to eliminate our problems.

Reflecting back, can you imagine how our programmer felt when he realized that while everyone understood this simple problem, he alone had to write it? He was faced with programming a complex system which had been presented as incredibly simple.

We failed to tell the programmer exactly, and in detail, what we wanted him to program. We did tell him what information we wanted but never explained to him the intricacies of getting all of that information and sorting it out.

The programmer should only be held responsible for coding and directing the flow and manipulation through the computer in precisely the manner we outline for him.

At the risk of oversimplification, this could be compared to a manager who is required to write a letter of an extremely serious and sensitive nature where his expertise and talent is required. He must dictate the letter and take the responsibility although his secretary will type it. So should he dictate the system that the programmer will program.

We have learned that computer salesmen and computer service salesmen are salesmen and not systems engineers. They are put on this earth to promote enthusiasm.

Systems engineers are here to design systems under the direction of the system user. The systems engineer can satisfy the customer (manager), only when the manager knows what he himself wants.

In short, the problems and responsibility for the system belong to the manager or user.

*Graham is the plant manager of the Wells Manufacturing Corp., San Francisco, Calif.*

'Sure it's depressing. This thing has a memory of 3 trillion bits and I can't recall what I had for lunch.'

155 OR 158?

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(Typical Monthly System Rental)

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|---|---|
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| EMM Enhanced 370/155 (with PSE + PME + DAT) | $32,000 |
| EMM Std 370/155 | $25,000 |

PERFORMANCE

| | 155 | 158 |
|---|---|---|
| VS Capability | Yes | Yes |
| All 370 Software | Yes | Yes |
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| Processor Speed Enhancement | Yes | No |
| Comparable Capability | Yes | Yes |
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# Kiviat Graphs May Provide Single 'Figures of Merit'

By Don Leavitt
Of the CW Staff

COLUMBUS, Ohio – While Kiviat graphs provide an easy way to communicate to management information on system performance, they may also provide a means of coming up with a single number that tells how "good" or "bad" the system is, according to Michael Morris, an independent performance consultant.

Though some measurement professionals feel such a single number is of questionable value, Morris pointed out that many managers have sought just such a simplistic definition of how well their systems are functioning. In fact, the approach he was proposing at the Computer Performance Evaluation Users Group (CPEUG) meeting is just a modification of one proposed earlier by H.E.B. Merrill in *Performance Evaluation Review*, Morris admitted.

## CW at CPEUG

In the face of variations on Kiviat graphs used in other presentations at the users group, he restated four conventions he saw as mandatory if the graphs are to maintain their usefulness. These guidelines are also required as a basis for the single number – the "Figure of Merit or Merrill Number."

The graphs should include an even number of indicators, half "good" and half "bad." These are plotted as radii on a circle chart, numbered with 1 at the top of the chart. The good measures are assigned to the odd-numbered radii, and the "bad" measures are put on the even spokes of the chart.

Choice of the measures to be plotted is deliberately left to the user, Morris said, but "good" measures are those which suggest good performance when they have high values. Conversely, "bad" measures are those that suggest poor performance as their values go up.

### Normalized Data

Though specifically not part of the conventions he was defining, Morris said he found it useful to work with "normalized" data, converted from whatever form it might have had as "captured" or calculated to a more conventional 0 to 100 pattern.

Merrill proposed multiplying the value of the second indicator by the first, the third by the product of the first two and so forth, right around the circle.

This might work, Morris argued, except in those cases where one or more of the indicators values is zero. Instead, he said, a Figure of Merit could be calculated by adding up all the "good" indicator values, then adding, separately, all the "bad" ones.

Subtract the "bad" total from the "good," and divide the result by the number of indicators. This will provide an average value, Morris noted. The range of average values, however, will be from -50 to plus 50. Since that is "somewhat awkward" for many of us, he suggested adding 50 to the average, to bring it up to a 0 to 100 scale.

### In the Stars

Although he was unwilling or unable to define the significance of, for example, a 10-point difference in "Merrill Numbers" calculated this way, Morris claimed all basically star-shaped Kiviat graphs (with high "good" values, low "bad" values), have Merrill Numbers in the 70 to 100 portion of the full range.

The applications of Kiviat graphs as quick visual indications of a system's bias or balance, and of Merrill Numbers extracted from the Kiviat graphs, is completely independent of the hardware being assessed, he said. In an experiment with a Control Data Corp. configuration, core storage was added to a system that appeared to be in trouble. After the addition, the system performed better – by any measure.

### 'Improved' Form

The Kiviat graph form "improved," becoming more "star-like," and the Merrill Number moved from 60 to 73. "But," pondered Morris, "is it really 13 points better? And does 13 points at this part of the scale mean the same thing as 13 points in another part?"

He was also worried, Morris admitted, that managers might take Merrill Numbers so much to heart that they would "settle for a 67" or some other arbitrary number as an acceptable level of performance. He also shied away from suggestions from the audience that the indicator values ought to be weighted before they were included in the Merrill Number calculation.

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# CPE People Challenged to Make Results Useful to Non-DPer

COLUMBUS, Ohio – "It's time the performance measurement people took stock of their objectives, their tools and their responsibilities to those who are directing information systems both in large corporations and in government agencies. It is the administrator who must decide whether the best course of action is to secure more equipment and higher costs or to live with less responsiveness and, therefore, user criticism.

"The proper decision must be based upon proper performance measurement," keynote speaker Jerry Hammett reminded the Computer Performance Evaluation Users Group (CPEUG) meeting here late last month.

The deputy director of administrative services for the state of Ohio said "the DP administrator has viewed performance measurement with great skepticism. Two reasons come to mind very quickly. Measurement has been applied as a challenge to requests for new equipment, and measurement technology has often been used very poorly with only limited real results."

The administrator is faced with monitoring output that is either too general or too specific, and comparison between systems seems impossible, he added. "My challenge to you is to determine and classify some primary parameters which quantify system performance for improved system analysis, measurement and evaluation. The standards must provide information useful to the executive who is not necessarily a measurement technician," he said.

A second challenge, Hammett stressed, is to define and develop techniques which adequately measure those primary performance parameters.

"The pitfall here is that the development of these techniques could modify or obscure the intent of the original parameters. [illegible] abundance of data readily available [illegible] many things which can [illegible] generated do not [illegible] effective evaluation of [illegible] computer system," he noted.

There are three [illegible] the manager [illegible] population problem which because of their larger organizational impact are beyond the DP manager's [illegible] the frequency of monitoring activity and "most important," the payoffs that can accrue to the administrator and the facility from the [illegible] of performance measurement.

The assignment of new applications and of the processing [illegible] cycle of the work to be done is often beyond the control of DP management. And yet Hammett went on, the rapidly expanding shop needs more frequent monitoring than the relatively stable facility.

Another determination of frequency of monitoring is the saturation of the existing system. As the system becomes more tightly utilized, the need for continual monitoring will greatly increase, he added.

If the technicians can meet the challenges, the administrators and the facilities will have four basic payoffs "which are neither all-inclusive nor priority ranked," Hammett said.

First, installations will truly find themselves in an environment where they buy only what they need. "We will buy computing by the pound and not by the ton," he quipped.

Installations will get substantially more life out of their systems, "and this becomes very important as we move more and more into longer term contracts.

"We will find that the cost-effectiveness of our systems is much better than we have heretofore experienced, and fourth, we will be faced with more satisfied users."

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## A Lesson From Sun

# New Software Not Prerequisite to Evaluation

COLUMBUS, Ohio – A DP shop moving toward computer performance measurement and simulation may not have to acquire all new software, according to Analyst Allen G. Pomerantz of Sun Oil Co., who told the CPEUG meeting last month how his company had modified a version of the General-Purpose Simulation System (GPSS) to generate a model of a computer system.

Sun's resources planning and evaluation group saw several advantages to using GPSS, even though it required extensive internal changes to meet their needs. First, it was already on-hand at Sun. Source code was available, and several people knew how to work with its logic and with its user-oriented language.

Unfortunately, it could not simulate discrete situations, such as channel or random access device queuing, and it included no CPU dispatch algorithm, priority allocation scheme or way of taking operating system overhead and system-related software "costs" into account.

The first effort at correcting these deficiencies focused on converting GPSS to a table-driven system, Pomerantz noted. This would allow discrete channel queuing and discrete device queuing, he said.

Based on SMF data that was being collected anyway, the tables also sup-

(Continued on Page 18)

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# New Software Not Prerequisite To Effective System Evaluation

*(Continued from Page 17)*

ported simulation of priority allocation of specific disk packs and an approximation of the Hasp CPU dispatch algorithm. Individual approximations of each job's disk and tape channel time was based on its actual number of EXCPS and average block size, the analyst said.

The output was available through the English-like GPSS end-user access language and the reports were formatted "in a way that was good for management comprehension," Pomerantz added, with a nod of acknowledgement to the challenge of keynoter Jerry Hammett.

The output also appears to stand up well in comparison with several other criteria, he went on. Specifically, it has been compared with the original SMF data from real runs of the jobs.

Although the GPSS results were as much as 20% off at first, tuning of the tables is expected to bring the difference down to the 10% level, "which seems to be considered acceptable for simulation."

Other matchups have been or are being made with the output generated by the Paces package and with simulations produced with the System Analysis Machine (SAM) simulation package from Applied Data Research, Pomerantz added.

A second effort at modification still under consideration will enable the Sun staff to add operating system overhead to the simulation model. The effect of IBM's Time-Sharing Option (TSO) is probably going to be added by "grafting" a model developed within another simulator package to the GPSS version.

The operating system will be mimicked by adding dummy programs that will compete with actual programs for system resources, Pomerantz explained.

The benefits he expects to gain from the use of the modified GPSS are in some ways as general as the "general-purpose" in the GPSS name. It will suggest what configuration strategy is best but will provide no exact statements of what the result of using a particular configuration will be.

Sun will not be using the GPSS tool for sizing of new equipment acquisitions, he said. But it does allow studies on the effects of changes in job classes or priorities.

It also includes the potential for use as a performance evaluation tool, Pomerantz noted, since it can highlight utilization of components and initiator/terminators. It should help identify system bottlenecks, the analyst concluded.

## CW at CPEUG

## Roster of CPEUG Attendees Includes Business Users

The Computer Performance Evaluation Users Group (CPEUG), which held its 10th meeting in Columbus, Ohio, late last month, is an activity of Task Group-10, a National Bureau of Standards effort focusing on computer performance management.

From the original handful of Air Force simulation experts, the group has grown until it now includes "anyone interested in the general area of performance measurement and evaluation." The Columbus meeting attracted 115 people, including representatives from oil companies, insurance companies and other nongovernmental installations.

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# FAA, Fedsim Learn Their Lesson After Pooling Project Resources

By Don Leavitt

Of the CW Staff

COLUMBUS, Ohio – Bringing together the skills and tools of people well-versed in computer performance evaluation and of people equally knowledgeable in the logic and purposes of their application programming can produce improvements in programming far beyond what either group could do by itself.

That is the essential lesson of a recent project that brought technicians from the Federal Computer Performance Evaluation and Simulation (Fedsim) center to the Federal Aviation Administration data center in Oklahoma City, agreed James A. Morris of Fedsim and Ruble Garner of the FAA.

## CW at CPEUG

In a joint CPEUG presentation here late last month, the two men noted that no matter how much "background" work Fedsim had put into trying to understand the FAA's large on-line Data Manager/User Request Link (DM/URL) system or the applications that used it, they couldn't match the comprehension the FAA programmers had gathered over the five years the system has been developing.

But Fedsim could help the FAA grasp the technical reasons the system wasn't meeting its expected production goals and what could be done to improve the system, so the two agencies set up a team to attack the problems.

DM/URL is a user-oriented, interpretive, on-line data base management system that is accessed interactively on a 1.5M-byte IBM 370/155 dedicated to the task, Garner explained. It was the backbone of the Manpower Information System (MPIS) and Consolidated Airman Information System (Cais), each of which was expected to be available to users in 10 or more centers around the country.

Cais is operational on a 24-hour basis and MPIS is in test mode 16 hours a day. When Fedsim was brought on the scene in April, MPIS was scheduled for production mode starting in September – but there were performance problems and concern about how it would function in a production mode.

### Two Necessary Tasks

Fedsim saw the need for two separate tasks: one to measure MPIS as it existed, the other to simulate the system to determine how it could be helped. Morris and his colleagues wanted to identify the current performance level, the hardware and software constraints and the changes that should improve performance.

Garner and his half of the team were put to work brainstorming to come up with what they thought might be wrong, based on their experience with the system. Ultimately 25 hypotheses were compiled and the Garner team settled in to determine how to prove the validity of each of these possible problem areas.

Hardware monitors were used to measure system level utilization and to perform a detail analysis of MPIS. Software monitors were applied to disk analysis – the DM/URL system shared disks with another FAA 370/155 – and to capture internal software utilization data.

But that wasn't enough. The FAA team members were called upon to define the system and develop special software to track module usage, priority usage, line utilization and the use of predefined process (PDP) modules from the system library.

Among themselves, the team members obtained data on messages in and out of the system and the total time, terminals served and priorities assigned to the PDP modules. A transaction time history was logged and the error statistics noted by IBM's Logrec were added.

The project team found the system had much higher CPU use than expected, it was effectively running as a sequential processing operation, and there was indeed disk interference from the other CPU. Within the MPIS coding and use, they found queuing problems and almost universal abuse of the priority scheme.

Some 16 simulation experiments were proposed and performed, and these were helpful in suggesting where changes might cause improvements or, in some cases, degradation to the system performance.

Several of the project recommendations have been implemented. Others are being implemented now. As a result of the joint Fedsim-FAA effort, Cais has been expanded to some 500,000 records and MPIS is once again being scheduled to go into production, although for reasons unrelated to the project it is now scheduled for next month.

Response time on the terminals, where the end-users are and where final judgment must be, has been improved 300% through the tuning suggested by the study.

## Proceedings For Sale

WASHINGTON, D.C. – The proceedings of the eighth meeting of the Computer Performance Evaluation Users Group (CPEUG), held last December, are now in book form.

Entitled *Computer Performance Evaluation, NBS Special Publication 401*, the 142-page book is available for $1.80 from the U.S. Government Printing Office, 20402.

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# GCS Payroll System Does Multicompany Processing

HUNTSVILLE, Ala. – Version V of the Payroll System from General Computer Services, Inc. (GCS) is designed for companies with as many as 200,000 employees, multicompany processing or holding company responsibilities, as well as multicountry installations.

Designed primarily for batch processing, Version V could be put on-line for use with IMS, Total or Vsam with minimal modification, according to a company spokesman.

GCS also provides – on an "as requested" basis for an extra fee – separate tax modules for users who need foreign taxation capabilities. In addition, the company provides tax maintenance service, including rewriting reporting programs, for $2,000/year.

Multiple federal identification numbers make the program particularly useful in companies organized as a single entity but reporting in multiple entitities, GCS noted.

The system has unlimited state transfer capability. This feature permits handling employee changes from city to city, or state to state an unlimited number of times during a given year and even within a single pay period with no manual processing, the spokesman said.

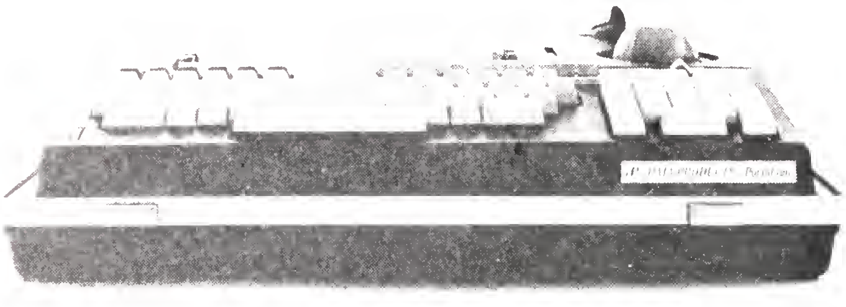
Alternate pay bank capability allows payment of employees through local banks where required by law.

A check backout procedure allows a check to be reversed (by number) up to 90 days after issue, the company said.

The system also collects personnel data for report generation to satisfy federal Equal Employment Opportunity Commission requirements as well as routine retirement and anniversary and other user-defined listings.

Written in ANS Cobol, the system can run in OS in 120K, but runs better in 200K, utilizing larger block sizes, GCS said. Under DOS, it takes 85K to 90K but runs better at 150K to 160K.

The $35,000 purchase price includes 80 man-hours of on-site installation support, user training and documentation, the company said from 1332 Meridian St., N.E., 35801.



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# 'PL/B4' Processor Backs Basic/Four

SANTA MONICA, Calif. – The Basic/Four programmer may obtain some of the control structure advantages of higher-level languages like PL/I, plus an ability to use meaningful mnemonic variable names without restricting his use of any features in Basic itself, with the PL/B4 processor from R&S Advanced Systems, Inc.

A PL/I control structure is accomplished through block structured conditional statements and looping statements, R&S said.

The looping statements in PL/B4 include those that cause a loop to be executed as long as a given logical expression is true (or false), and those that cause a loop to be executed a specific number of times.

PL/B4 programs are free form; statements may begin and end anywhere within an input line or series of input lines and – with the exception of quoted character strings – may freely contain imbedded blanks and comments. PL/B4 allows the use of mnemonic variable names and alphanumeric statement labels.

PL/B4 is said to be "especially convenient" when used as a programming tool in conjunction with R&S's Business Oriented Word Processing On-line System (Bowpos).

PL/B4 can be used on an 8K Basic/Four with a disk. It is available for $2,500. Bowpos, which the user "really needs," costs an additional $3,500.

A PL/I cross-compiler version of PL/B4 that runs on a DOS-oriented 360 and produces Basic code for the Basic/Four is also available for $2,500.

R&S Advanced Systems is at 2210 Third St., 90403

# Cosmic Package Determines Standard Statistical Models

ATHENS, Ga. – Installations with IBM 360 or Univac 1108 capabilities can run efficient procedures for determining theoretical statistical models for empirical data, under several approaches, with the appropriate version of a software package from the Cosmic clearinghouse.

The package provides three options. The first, a theoretical approach, is the so-called Pearson System of frequency distributions.

The other options provide – in Cosmic's words – a "straight-forward empirical approach" to the problem. Known standard statistical distributions are presented as prospective models for the sample input.

The first of these empirical approaches includes continuous distributions, while the other covers discrete models.

The 360 version of the program is written in Fortran IV and cataloged under Cosmic's number MFS-22994. The Univac 1108 packaging is done in Fortran V and is numbered MFS-21466.

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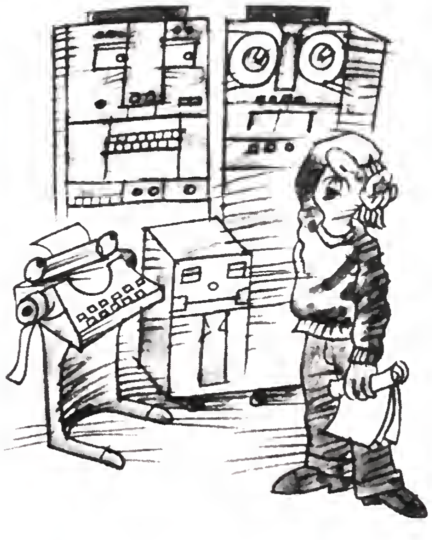

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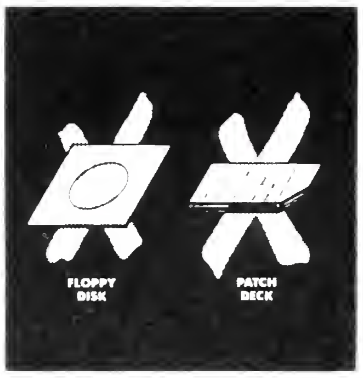

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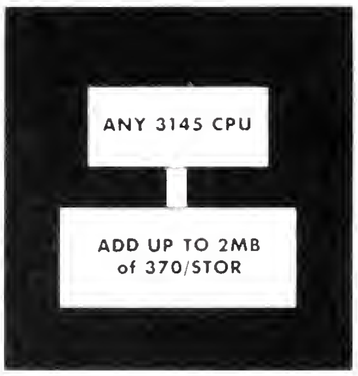
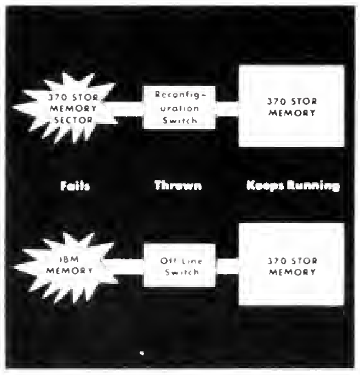


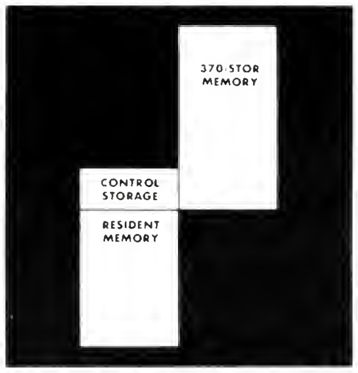
### NO CPU ALTERATION

370/STOR 145 installs directly to your 3145 processor. No wiring changes. No model changes when you expand memory beyond your current model's capacity. That means Cambridge can increase your model 3145 memory to a full two megabyte capacity without any CPU alteration.



### UNIQUE MEMORY PROTECTION

370/STOR 145 detects and corrects all single-bit errors, and detects multi-bit errors. So do other 145 memories. So to be different we add a reconfiguration switch to let you dial out failed 370/STOR memory, *plus* an off-line switch to dial out failed IBM memory. Either way, you keep running.



### HIGHEST MEMORY ADDRESSING

Even IBM must change address lines when you add its memory. But not Cambridge. 370/STOR 145 is directly addressable up to 2048K without any change. It floats on top of any IBM address level. That's the secret of our modular expansion, lack of CPU alteration, and freedom from console file tampering.

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# COMMUNICATIONS

## Data Briefs

### Teleray 3700 CRT Terminal Has Space-Over-Data Feature

MINNEAPOLIS – An upper-/lower-case CRT terminal with dual data rates up to 9,600 bit/sec and space-over-data features is available from Research, Inc.

With a 1,920, 80 by 24 character capacity and a 12-in. CRT display, the Teleray 3700 operates in character mode with bottom line entry and scroll-up capability, the firm said.

The company added the terminal has a 128-character Ascii set which can be viewed in a wide character (40 by 24) format.

The 3700 is said to interface with the RS-232, the current loop and the TTL.

As with the Teleray 3300, the 3700 has logic, character generation, drives and interface on one plug-in board; every chip is a plug-in, the company said.

Serviceable throughout the country, the 3700 costs $1,880 with delivery in 60 days from the firm which can be reached through P.O. Box 24064, 55424.

### Lockheed Extends 3200 System

PLAINFIELD, N.J. – A communications controller has been added to Lockheed's 3200 System control processor unit to permit interfacing with combinations of up to 32 local or remote entry terminals. Serial mode transmission is used between line controllers and associated terminals, and data is transferred between the MAC 16 central processor and local terminals at a maximum rate of 19.2 kbit/sec.

The serial local/remote communications terminal, which has characteristics similar to an earlier Lockheed display, can transfer data over distances of 14,000 feet by wire or over telephone lines for greater distances.

Remote terminals are connected to line controllers via modems using full-duplex transmission and transfer rates of 1,200-, 2,400-, 4,800- or 9,600 bit/sec. Data rates are switch-selected at the terminals.

An IBM 360 and 370 communication capability in the system can be used concurrent with keying and is initiated by supervisory command. Communication protocol between the Lockheed 3200 and the mainframe is binary synchronous.

Transmission characteristics are compatible with the IBM 2701 controller, 2703 transmission control, 3704 or 3705 communications controller.

Automatic answering is provided as an option. Transmission is half-duplex, synchronous at 1,200-, 2,000- or 2,400 bit/sec over voice lines and 4,800- and 7,200 bit/sec over conditioned lines.

The lease-only controller costs from $245/mo to $275/mo on a five-year lease with maintenance. The firm is at Route 22, 07061.

### No Longer Produces the 103

## AT&T Wavering on Non-Bell Devices?

By Ronald A. Frank
Of the CW Staff

Indications are growing that AT&T may be on the verge of modifying its policies with respect to data communications equipment.

In both the equipment supply and regulatory areas, major changes apparently are under way behind the scenes. In part, these changes are based on external pressures.

In a marked departure from present policy, AT&T may soon approve non-Bell

### Analysis

data sets for use by its customers. This decision is presently limited to low-speed 103-type modems and is caused in part because the Bell System is no longer manufacturing the 103.

An AT&T spokesman admitted the 103 data set was not being produced but said most Bell System operating companies still had a supply of the unit. Asked if the telephone company might refer users to non-Bell suppliers of equivalent data sets, the AT&T spokesman said he knew of no such practice and added that it would be against Bell System policy.

At the same time it was reported that a facility of Bell Laboratories in Holmdel, N.J., has been testing data sets of this type from five vendors. It is believed that these tests are aimed at determining whether the non-Bell units could be substituted for 103s.

It was not clear how (if at all) the non-Bell data sets would be handled by the telephone company. It would be possible for Bell maintenance personnel, with AT&T's approval, to install and service the units, but it seemed more likely that the non-Bell data sets would be recommended to customers by Bell data consultants. The user could then make any arrangements directly with the non-Bell supplier.

A related question deals with whether these "approved" data sets would require the use of a Data Access Arrangement (DAA).

On the regulatory front there were indications that Bell might be considering the introduction of a certified DAA-type module inside data sets in place of the DAA, which has drawn much opposition from both users and non-Bell suppliers.

AT&T sources in New York apparently are telling noncarrier suppliers that they expect some type of certified module inside modems. They are citing the recent Phone-Mate decision which allowed the introduction of modules, instead of external connecting arrangements, in phone-answering devices, and adding it is just a matter of time before the principle is applied to data devices.

There are presently at least three docket proceedings before the Federal Communications Commission (FCC) which deal with either the technical or economic aspects of the Bell connecting arrangements and the question of potential harm to the telephone network. And the interconnection office of the FCC staff has received little substantive data from users or non-Bell vendors relating any incidences of harm caused by non-Bell devices [CW, Sept. 25].

In most instances where Bell has tried to justify the existence of the DAA, it has not made a convincing case. In a recent New York decision against New York Telephone, the Public Service Commission (PSC) said Bell had been "given every opportunity to establish a firm foundation for its DAA rates" but "it failed to utilize its opportunity and instead chose to rely upon general statements supporting those rates." (See box.)

While none of these items in themselves points conclusively to a more lenient approach on DAAs from Bell, together they represent at least potential pressure for Bell to conclusively prove the issue of harm from non-Bell data sets.

For users, the outcome is important. Most customers feel they will get better service when a module is supplied as part of a modem and maintained by the supplier instead of the phone company. The outcome of these behind-the-scenes events should become clearer in the next few months.

### DDA Users in N.Y. Get Rates Reduced

ALBANY, N.Y. – Users who install Data Access Arrangements (DAA) but elect not to install a telephone will pay proportionately lower rates, according to a recent ruling by the New York Public Service Commission (PSC).

The ruling was the result of a complaint brought by Dr. Robert J. Robinson, director of the computing center at the State University of New York. Robinson had complained to the PSC that the New York Telephone Co. tariff setting equal rates with or without a phone for DAA users was unjust.

The PSC ruling agreed, stating a credit was necessary in order to treat DAA customers in a manner comparable with New York Telephone's data set customers.

As a result of the PSC decision, DAA rates for users without a phone will be reduced $1/mo compared with users who have both a phone and a DAA.

New rates are required to be filed by New York Telephone by Nov. 18. The lower charges will probably take effect 30 days after they are filed, a PSC spokesman predicted.

## Microprogrammed CRT Operates In Stand-Alone and On-Line Modes

CUPERTINO, Calif. – Designed for data entry applications and typical time-sharing jobs, the Model 2640A microprogrammed computer terminal is suited for use in stand-alone or on-line page and character mode operation, according to its vendor, Hewlett-Packard (HP).

Providing a 1,920-character capacity in 24 lines of 80 char./line, the display forms characters in a 7 by 9 dot matrix generated in a 9 by 15 character cell.

Up to four plug-in character sets are available, including the standard Roman font, math and line drawing sets with sub- and superscripts and Greek characters.

Data can be viewed 24 lines at a time by scrolling, and lines that have rolled off the screen remain in memory and are available to the user via roll and page keys, HP said.

Full off-line editing capability allows verification and correction of data before transmission to the CPU, the firm claimed. Sending one character or block of characters at a time, the 2640's asynchronous data transmission of Ascii characters is RS-232C-compatible at selectable rates up to 2,400 bit/sec.

The terminal's modularity also permits interfacing with a variety of peripherals. Presently available is a duplex register making the 2640A compatible with the Model 9866A line printer which prints hard copy at 240 line/min.

With continued work on the project, the firm said it expects to have mass storage capability soon.

Operating with an Intel 8008 microprocessor combined with up to 8K bytes of 4K random access semiconductor memory, the terminal can store over 400 lines of data, according to the firm.

Providing users with a product it claimed is similar to the SuperBee manufactured by Bee-Hive, the Hazeltine 2000 and the Teletype Model 40, the firm said the 2640A is available for $3,000 from 11000 Wolfe Road, 94304.

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# Omnus Programmable Front End Compatible With Univac 1100s

SANTA ANA, Calif. Omnus Computer Corp. has introduced a fully buffered, programmable front end designed to be plug-compatible with Univac 1100 computers.

Guaranteeing 99% uptime, the firm claimed its dual processor Omnus-1/CU is an enhanced replacement for the Univac Communications Symbiont Processor and the Univac Communications Terminal Module Controller.

Up to 128 independent full-duplex terminals can be connected to the Omnus unit, which is interfaced to a single Univac 1100 processor I/O port, the company said. The firm said the device also accommodates terminals not currently supported under Univac's Exec 8 operating system, including the IBM 2741 and 2780.

Operating at a sustained speed of 400 kbit/sec, the Omnus-1/CU represents an improvement in throughput over the Univac devices of one order of magnitude, according to the firm.

The front end is also said to use only 32K bytes of memory for up to 128 lines, while the Univac machines require 131K bytes.

The unit sells for $214,000 and is available in 90 days from the firm at 1310 E. Edinger, Suite B, 92705.

# 2740-Type Terminal Includes 32K Memory

SANTA CLARA, Calif. Data Measurements Corp., a subsidiary of Cetec Corp., has announced an interactive terminal designed to be compatible with IBM 2740 II communications protocol.

The DMC 442 includes a programmable microprocessor with up to 32K of memory and a 30 char./sec impact printer. The newly announced IBM 3767 will include many of the features of the DMC 442, Data Measurements claimed.

Standard features include a 440-character buffer, VRC and LRC checking, buffer receive, editing and up to 2,400 bit/sec asynchronous or synchronous transmission speeds. The DMC 442 incorporates the Diablo 30 char./sec impact printer with selectable 10- or 12 char./in. spacing, electronic keyboard and interface for optional 10-key numeric pad.

Purchase price is $5,750, with three- and five-year lease plans available. Delivery is 90 days from 2115 De La Cruz Blvd., 95050.

# Choosing the Right Vendor(s) All Economics, Not Engineering

CHICAGO – The choice between selecting univendor or multivendor data communications systems should depend on economic benefits and not "engineering niceties."

This was one of the conclusions drawn at a session on vendor support given at the annual CICA conference by John F. Gross, communication technical services manager at United Air Lines.

The disadvantages of the one vendor approach essentially become the advantages of the other, and the best solution for some users may be something in between the two support philosophies, Gross suggested.

The univendor approach provides limited least-cost alternatives and an overdependence on the vendor's engineering support. Gross called the latter the "gullibility syndrome."

The single supplier may limit functional expansion and hamper new applications, but the impact can be minimized by building an in-house technical capability, he said.

With multivendor communications systems, the design and engineering support is fragmented so the user must assume major responsibility for coordination, and unlimited alternatives can overwhelm, Gross cautioned.

To lessen these disadvantages, he suggested more detailed user requirements, well-defined trouble isolation procedures and extensive user participation in managing the system.

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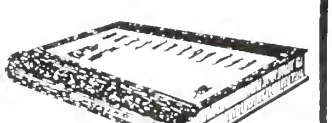

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# Switched Net Will Provide Privacy, Call-Back Features

*The Data Transmission Co. (Datran) is presently configuring an all-digital network for data transmission communications users. The company plans to add a switching capability to this system later.*

*The Datran system has been operational since Dec. 1, 1973. Private-line data transmission service at various speeds is now being offered between Houston and St. Louis, Mo., and four other intermediate cities.*

*In a recent speech at the IEEE Electronics and Aerospace Systems Conference in Washington, D.C., E.V. Farinholt, product manager of transmission services at Datran described some of the network's features.*

By E.V. Farinholt

Special to Computerworld

The digital circuit switch, coupled with an "essentially error-free" long-haul trunk, provides a transparent, full-duplex data circuit on demand to the subscriber. The switched services being offered by Datran are 2.4, 4.8, 9.6 and 19.2 kbit/sec synchronous channels with a 99.95% error-free second performance. The switch will make most connections in less than one second.

In order to completely meet the needs of the data communications user, a number of features have been built into the switched service. Along with the usual rotary arrangement, Datran provides privacy, call-back, out-of-service and abbreviated addressing.

Privacy allows a subscriber to define a list of other subscriber lines which are allowed to call him. A privacy table is maintained on disk for each subscriber that has the privacy feature.

Calls to such a subscriber, made by subscribers not on the destination party's privacy list, will be denied by the switching system.

With the call-back feature, any subscriber can "camp on" the destination subscriber's circuit if he is busy. If the destination is busy, the network will complete the call when it becomes available. The subscriber must request call-back prior to sending the destination address and, when the destination is busy, must remain "off-hook" until the call can be completed.

When a line is in the call-back mode, the switching system sends a code to the subscriber set which turns on a call-back status indication. If the subscriber goes "on-hook" prior to completion of a call-back call, the call is canceled by the switching system.

The system is able to queue up to six call-back requests for each number called. When a subscriber makes a call-back request to a line where six call-back calls are already queued, the call-back will not be honored and his subscriber set will be given a simple "busy" response.

### Out-of-Service Feature

The out-of-service feature permits any subscriber to place his line in a condition such that any subscriber calling him will receive an indication that he is out-of-service

The out-of-service condition is controlled by a switch on the subscriber set. When the switch is depressed, the subscriber set automatically originates a call and sends a special address which causes the switching system to place the line out-of-service.

When the switch is released, the subscriber set sends a message on the supervisory path which the system recognizes as a request to return the subscriber line to service.

Abbreviated addressing will let a subscriber send fewer than the standard seven digits to identify his desired destination. Two types of abbreviated addressing will be offered, type 1, where the subscriber normally sends seven-digit addresses and must send an escape digit at the beginning of the addressing sequence followed by a zero-, one-, two- or three-digit abbreviated code; and type 2, where the subscriber usually sends a one-, two-, or three-digit abbreviated address code and must send an escape digit at the beginning of the address sequence followed by a seven-digit address code.

The number of abbreviated address digits a subscriber sends is dependent on the size of his abbreviated address list.

Due to the common computer control of the switched network, additional features and services such as traffic analysis, broadcast, etc. can be provided.

To make a call, a subscriber will first key into the data set the address of the destination along with any special service requests. This information is stored in the data set. After dialing, the subscriber will depress the Request-for-Service key which causes his supervisory line to change state from "on-hook" to "off-hook."

This state change is passed along the supervisory channel to the activity scanner, which registers the change in its memory and formats a "requesting subscriber" message for transmission to the computer. When the computer asks for requesting subscribers, this message will be passed to it.

From the activity scanner location, the computer creates an index to read the subscriber information from disk. Among other things, this data includes the speed of the subscriber line and its location in the matrix. The computer selects an idle digit receiver and issues a command to the matrix control to set up a connection between the subscriber's channel and the assigned digit receiver.

Once this connection is properly made, a character is sent through the digit receiver to the data set, which causes the stored address to be transmitted. This data is checked for errors and special service requests by the digit receiver hardware. If no errors are detected, the address is then passed into a buffer in the computer.

If the call processing program determines the call is local, the computer uses the last four digits to determine the activity scanner location of the called subscriber and its present status. If it is not busy, the activity scanner location provides an index to read the destination subscriber information from disk. The computer then selects a second idle digit receiver and connects it to the destination line.

(Continued on Page 28)

mable '3270' has its own.

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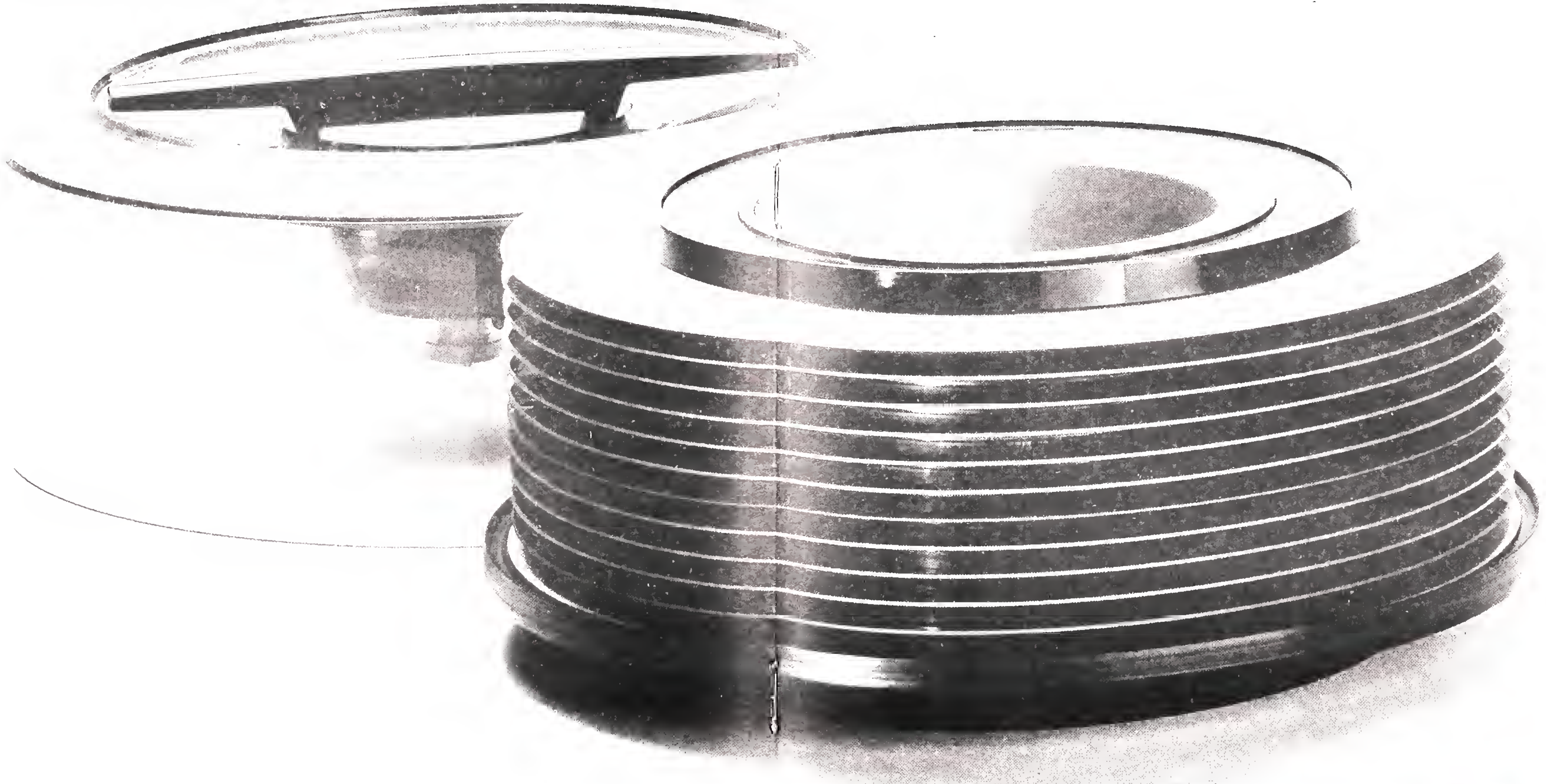

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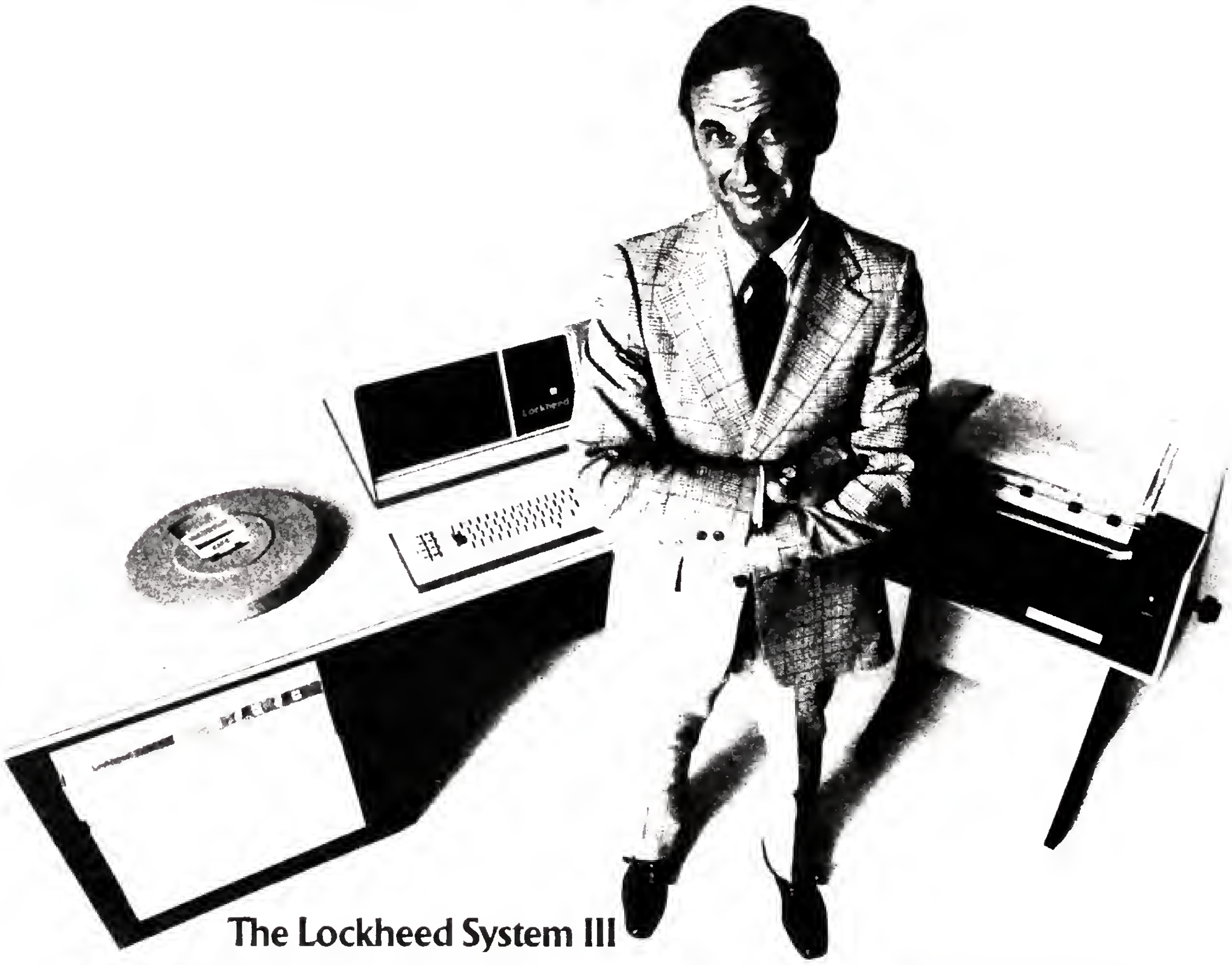

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# Switched Net Includes Privacy

(Continued from Page 25)

A test character is sent through this digit receiver to the destination data set, which responds with its seven-digit address. This address is received in the computer and compared with the dialed address to make sure the proper connection has been made and that proper transmission over the destination line may take place.

Once these checks are complete, ring characters are sent first to the destination data set and then to the originating data set. Both data sets return the ring character to the system to check proper receipt of the ring at the data set. Once ring and ring-back have been set up in the DCCs, the computer commands the matrix to disconnect both digit receivers from their respective lines and then to connect the two lines directly.

When the called subscriber answers by depressing his "Request-Service" key, an answer character is sent to the originating data set over the data path and an "off-hook" is sent over the supervisory path to the switching system.

Receipt of the status change in the switch begins the billing time. This time is entered in a core-resident call record which is maintained in the district office for the duration of the call.

When an answer character is received by the originating data set, a handshaking sequence is started that checks the proper state of the data set/terminal interfaces. If proper, both data sets go into the "Data" state and allow data transmission between the two terminals. When either set is "cleared," the supervisory line to the district office changes to "on-hook."

This causes the system to enter a disconnect time into the call record and transmit the call record to the data collection office. It also causes the connection between the two lines to be disconnected. Both lines are then returned to idle status.

If the call is nonlocal, the originating district office formats and transmits a trunk assignment request to the regional office on which the destination district office is homed. The regional office checks its trunk tables to find an available direct trunk or trunks between district offices.

If the line is available, the destination district office connects the assigned trunks to that line and sends a response message to the regional office indicating the action taken.

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## Bits & Pieces

### Solid-State Power Sources Eliminate Transformer Need

ROSEMEAD, Calif. – Pacific Electronic Enterprises has introduced a line of power sources ranging from 250 VA to three kVA.

Incoming electrical utility power drives the solid-state power supply device, which in turn produces conditioned and regulated electrical current for the CPU, without the need for bulky transformers, a spokesman said.

This kind of power source can give the user the ability to absorb a line transient going all the way to zero for half a cycle, which is enough to produce false data in an unprotected CPU, the spokesman added.

The 250 VA power source, with variable output from zero to 125 Vac, costs $695 from the firm at 2643 N. San Gabriel Blvd., 91770.

### Continued IBM Maintenance Promised to SEC Users

CHICAGO – IBM 025 and 026 keypunch users who have attached a Left Zero Fill Insert device from Specialized Electronics Corp. (SEC) can expect continued IBM maintenance of their equipment, according to a letter sent from IBM to SEC.

The $650 attachment comes equipped with its own power source and will not disable the keypunch in the event it fails, a SEC spokesman said. A technician can install the device in about two and a half hours, the spokesman noted from the firm at 5642 W. Diversey Ave., 60639.

### PE Data Recovery Detailed

PLAINVIEW, N.Y. – A Quantex bulletin on "Reading Phase-Encoded Digital Data" details the recovery of such data from magnetic tapes that have been formatted in accordance with the Ansi specification for recorded magnetic tape cartridge for information interchange, 4-track, 1/4-in., 1,600 bit/in. phase-encoded tapes.

The method described involves reading the direction and spacing of flux reversals to identify "1" bits and "0" bits.

Copies are available from 200 Terminal Drive, 11803.

### Mag Tape Cleaner/Rewinder Locates Defective Tapes

BURLINGTON, Mass. – The Model 101 magnetic tape cleaner/rewinder features more precise locating and easier repair of defective tape, according to Computer-Link Corp.

The Model 101 is a double-press tape cleaner/rewinder with dual capstans for independent tension control during both cleaning and winding modes. The speed is 180 in./sec and the price is $2,200 from the firm at 14 Cambridge St., 01803.

## Released in U.S. by Honeywell

# Series 61 Backs Small DP Operations

WALTHAM, Mass. – The Level 61 computer systems, smallest models in Honeywell's Series 60 computer line [CW, May 1], are designed to meet the growing DP requirements of firms or departments currently using service bureaus, tabulating or accounting machines or manual bookkeeping methods and to provide a compatible growth path for Honeywell's Model 58 users, according to the firm.

Compagnie Honeywell Bull of France makes the Level 61 processors and some peripherals. Previously, the computer systems had been available only in Europe.

The Model 61/58 batch and multiworkstation version and the Model 61/60 transaction processing system compete with such equipment as IBM's System/3 Models 6, 8 and 10, Burroughs' 700 and 1700 and Singer's System Ten, Honeywell said.

The Model 61/58 can be leased at prices ranging from about $1,400/mo to $3,000/mo and will be available for delivery in the fourth quarter of this year.

The Model 61/60 can be leased at prices ranging from about $2,900 to more than $4,000 and will be available in the second quarter of 1975.

### Independent Systems

Both models can function as independent systems in a small or medium-size company or as a satellite system, processing and transmitting information to a large central computer from such decentralized operations as warehouses, factories, laboratories or branch offices of a large firm, according to Honeywell.

The Model 61/58 entry-level system processes batch programs serially and can be expanded easily to a multiworkstation version that allows simultaneous processing from up to four terminals with the batch program having priority, the company said.

The Model 61/60 includes a front-end processor of 8K, 12K, or 16K of MOS memory and allows simultaneous use of up to eight terminals and one batch program with the conversational programs having priority.

The Level 61 General Comprehensive Operating Supervisor (GCOS) operating system is available in three fully compatible versions which allow the entry-level batch user to move up to a full transaction processing system, the firm said.

The Model 61/58 uses Minicobol, ANS Cobol-68 or Editor languages. Model 61/60 users can also select ANS Cobol-74 or Basic.

The main processing memory has a complement of 78 hardware instructions and a cycle time of 1.2 µsec. A 350-nsec read-only memory (ROM), peripheral simultaneity and a no-sort disk file structure contribute to low storage requirements and reduce total processing time, Honeywell said.

An optional 800-nsec MOS extended memory store, ranging from 16K to 64K bytes, enhances the 5K or 10K main memory.

Peripherals include mass storage subsystems with capacities ranging from 3.456M bytes, printers with operating speeds ranging from 100 to 650 line/min and various input devices including card readers and punches and an optical mark reader.

# HP 3000 CX Series Features Spooling, Virtual Memory, DBMS

By Patrick Ward
Of the CW Staff

PALO ALTO, Calif. – Hewlett-Packard's 3000 CX series of "minicomputers," a lower-priced replacement for the firm's 3000 line, offers a common operating system that supports full spooling, data communications, and a data base management system, none of which were available on the 3000 line.

The 3000 CX line also offers RPG for the first time on an HP machine, plus a Basic compiler, which the company said provides the 3000 CX with much faster Basic program execution than the 3000.

Cobol is carried over from the 3000, but the 3000 CX offers a full ANS version except for the report writer feature, according to an HP spokesman. The machines also support ANS Fortran and HP's Systems Programming Language (SPL).

HP 3000 users will have to recompile their application programs to take advantage of the 3000 CX's capabilities, the HP spokesman mentioned.

Also new is a microprocessor, based on a 32-bit LSI read-only memory with 176 nsec cycle time. This gives the 3000 CX a set of 182 instructions, compared with 168 on the 3000. Decimal arithmetic and extended precision floating point are among the optional instructions.

The microprocessor is not user programmable due to the complexity of working with the 3000CX's stack architecture, the spokesman explained.

The spooling capability helps the 3000 CX achieve substantially increased throughput in multiprogramming environments compared with the 3000, the spokesman noted.

The 3000 CX's MPE/C multiprogramming operating system can support 11 or 12 jobs running concurrently, according to the firm. The operating system allows Cobol and RPG program development and execution from a terminal, the spokesman noted.

The 3000 CX's Total-based data base management system works with any of

*(Continued on Page 31)*

# Key-Edit 1000 Processes Jobs While Operators Key In Data

WALTHAM, Mass. Consolidated Computer Inc.'s Key-Edit 1000 data entry system is designed to concurrently process three background jobs while operators are keying in data from up to 56 CRT stations.

The Canadian company has previously OEMed its Digital Equipment Corp. PDP-11-based system to ICL, Fujitsu and Echodata in South America. The firm's U.S. office is now offering the Key-Edit 1000 along with the smaller, previously introduced Key-Edit 50 system.

The Key-Edit 1000's concurrent processing capability means the sytsem can transmit to a central site at 2,400 bit/sec, run a tape-to-print routine and process files while operators enter data, a spokesman said.

The user can order core storage up to 192K bytes, up to 120M bytes of disk storage and up to eight tape drives.

Local keystation CRTs can be located as far as 6,100 feet away from the central processor through the use of seven concentrators, each of which handles up to eight CRTs. Remote terminals can access the system through user-supplied modems, the firm noted.

The Key-Edit 1000 User Programming Language (UPL) comes in foreground and background versions. UPL can logically relate data from one record to the next, expanding editing capabilities beyond one record at a time, the firm said.

A Key-Edit 1000 system with 56K processor, real time clock, 29.2M byte disk, magnetic tape unit and 30 char/sec matrix printer costs $1,300/mo, including maintenance and applications software. Each CRT keystation costs $95/mo from the firm's U.S. office at 275 Wyman St., 02154.

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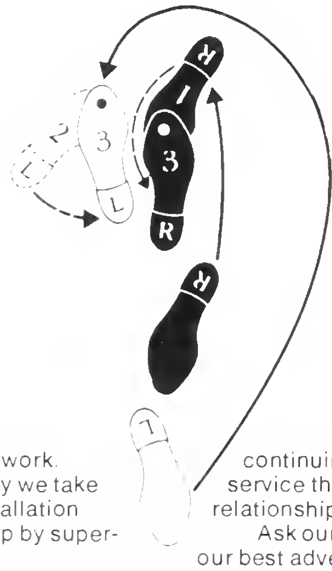

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# Burroughs Line of Readers Has Microprocessor, Communications

DETROIT – The S 1000 series of document readers from Burroughs Corp. is said to process a broad variety of items including checks, deposit slips, utility bills, insurance premium notices, credit card slips and other unit documents.

The performance range of the S 1000 series extends from an operator-attended, two-pocket proof encoder to an operator-monitored, 20-pocket item processing system with automatic feed, document reading, data capture and data communications, the company said.

The four S 1000 models are the S 1200, S 1300, S 1400 and S 1500.

All models include an integrated system and data communications processor. This processor incorporates large-scale integrated (LSI) circuitry, has 4K bytes of memory expandable to 32K bytes and can transmit captured data to a central computer system.

The operator console of the S 1000 series had a 10-key numeric keyboard, a 21-column printer and a 16-character alphanumeric visual display for communication between the system and the operator. A 25 char./sec magnetic ink character recognition (Micr) or optical character recognition (OCR) encoding module is available with all S 1000 models, the firm noted.

A selection of two to 20 sort pockets is available with all the S 1000 models. The pockets are equipped with either a detail tape lister or a variable speed drum printer which furnishes a chronological listing of all documents in the pockets, the firm said.

A 160 line/min chain printer is optional on the S 1000 systems. The printer can supply a hard copy of items processed and of all messages sent to the S 1000 from a central computer system.

For storage of data captured during the document reading or encoding operation, a choice of up to four magnetic tape cassettes or two mini disks is available. The mini disks use a flexible media and are industry-compatible, Burroughs said.

They store 236K bytes of information with an average access time of 260 msec. The mini disks provide additional capabilities for users who require the selective sorting and retrieval of data as well as higher data transmission speeds.

The basic S 1200 has manual document feed, full-field encoding, endorsing and operator pocket selection.

The basic S 1300 has the additional feature of a Micr read module.

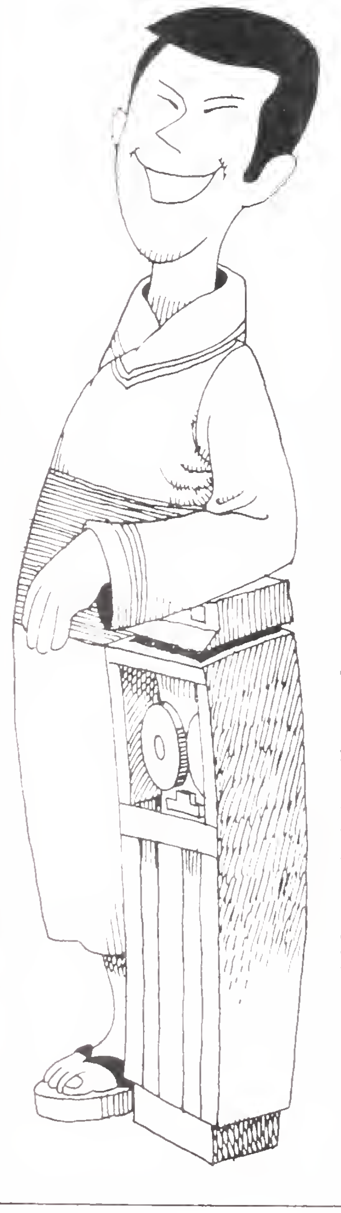
The basic S 1400 model is an S 1200 with an automatic document feed module.

The basic S 1500 model combines all of the features of the other models and can automatically sort documents at up to 7,200 item/hr.

A series of Burroughs standard application program products are available for use on each of the models. Complementing the program products is a new programming language called Encoder Programming Language (EPL). With EPL, the S 1000 system can be programmed to meet various national banking, commercial and government market standards.

EPL gives the user an opportunity to address a high-level language, eliminates costly program development and allows the user to implement changes in the S 1000 program without recompiling.

First deliveries of the S 1000 series are scheduled for the third quarter of 1975. Purchase prices for typical configurations range from $10,500 to $42,000. Comparable monthly lease prices range from $300 to $1,250.



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COMPUTERWORLD

## Mo. Plans $19,000 Savings

# COMs Consolidated Under Single Vendor

By Patrick Ward
Of the CW Staff

JEFFERSON CITY, Mo. – Consolidation of the state of Missouri's computer output microfilm (COM) contracts with a single vendor will save the state a projected $19,000/year and make it easier for user departments to try the technique, according to Ken Pike, a systems analyst with the state's Division of EDP Coordination.

A 224 frame duplicate fiche cost state agencies an average of 12.99 cents before contract consolidation in September 1973, Pike explained. The cost was 10.4 cents under the first year of the single contract, he said.

Inflation raised this price by 1.6 cents in the second consolidated contract starting in September 1974, Pike noted, but he said the price under the previous system would have risen too.

The state projected its COM usage over the second contract period based on the last three months of usage figures available from the first contract period, Pike noted. The state would have had to pay $19,000 more for the second contract's usage level if the state was still relying on the multiple vendors, he commented.

The single-vendor award to Computer Microdata of St. Louis also led that firm to establish a branch office at the state capitol of Jefferson City.

Another benefit from consolidation is that agencies interested in COM do not have to go through the process of negotiating contracts with a COM service bureau, but can just send a letter to one state office, Pike said.

The state processed about 122 million pages of microfiche in the first eight months of its consolidated contract, Pike said. This extends to 184 million pages for the year, which is 19% above the estimated usage figure, in the contract, Pike observed.

If the monthly usage figures were based on the last three months of recorded use, the underestimation could have been as high as 57%, Pike commented.

The state processed over 36 million microfiche pages during the first three months of the contract, but in the last three months studied, the figure rose to over 60 million.

The Employment Security, Welfare and Revenue departments are the biggest COM users in Missouri's government, Pike said. They and other state agencies tend to use COM for "getting information out to people who need it in the field," not for archival purposes, he remarked.

The Employment Security Department, for example, outputs its job information records on microfiche by type of job and region and mails them daily to its offices throughout the state.

A client can use a microfiche reader to look into job offerings for his particular skill in a given area, and the same information is available for any region in the state.

The department is experimenting with on-line terminals for the application, Pike said, but he pointed out that a fiche reader rents for $10/mo compared with about $170 for a CRT.

A 10 cent stamp will mail the COM equivalent of 896 to 1,120 pages of print anywhere in the U.S.

And for the same reason, carrying a massive amount of COM data from place to place is much easier. COM also reduces the amount of storage space needed for records.

An on-line system better suits the user who needs information updated quickly, Pike allowed. Microfiche also needs a reader device to be useful.

As for the human interface and how well users respond to looking through microfiche readers, Pike said that his office hasn't received enough feedback to make a judgment.

# HP 3000 CX Series Features Spooling

*(Continued from Page 29)*

A 3000 CX can support up to 32 interactive terminals.

The System 50 CX is the smallest 3000 CX machine. It includes a 96K processor, a 5M-byte moving-head disk, 800 bit/in. magnetic tape unit, systems console and 16-port asynchronous terminal controller.

The 50 CX includes basic utility software and costs $99,500.

The System 100 CX also has a 96K CPU, magnetic tape unit and 16-port controller and offers additional hardware with a 600 card/min reader and 200 line/min printer, plus increased disk storage of 10M bytes. It cost $129,500.

The $171,000 System 200 CX has a 128K CPU, a 2M-byte fixed-head swapping disk and 47M bytes of moving-head disk storage.

The largest System 3000 CX includes a 128K processor with an expandable 2M-byte swapping disk and a 47M-byte disk file, plus a newly introduced 1,250 line/min printer and card reader punch. The cost of this system is about $203,500.

The 3000 CX prices are about 10% to 15% below earlier HP 3000 models, the firm noted.

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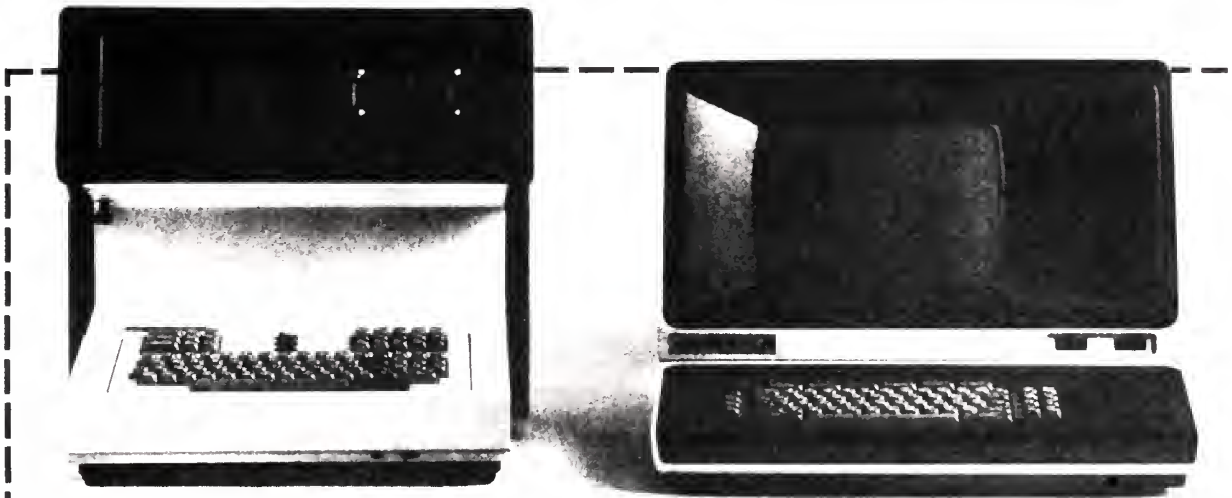

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### Triples Current Storage

## DG Moving-Head Disk Stores 46M Words

SOUTHBORO, Mass. A moving-head disk pack subsystem from Data General Corp. has a capacity of 46M 16-bit words.

The subsystem, which includes a controller for three additional drives, can transfer up to 403K 16-bit word/sec, the firm said.

The system will give the firm's users more than three times the storage capacity of its current top-of-the-line moving-head disk drive, Data General said.

Manufactured to Data General specifications by Control Data Corp., the initial disk pack subsystem, which includes master drive and controller, costs $30,500. Subsequent drives are priced at $24,500. Shipments will begin in February.

Major features of the disk pack include:

- Dynamically braked spindle drive a disk pack can be removed 15 second after the drive is shut off because of dynamic braking, startup time is also 15 seconds.
- Fast access time – on the average, 30 msec are needed to head positioning.
- Each removable disk pack contains 19 data surfaces and one servo positioning surface; each surface has 411 data tracks.
- Interfacing flexibility – disk drive access can be shared by two Data General minis; up to four disk drives can run on one controller.
- Fast transfer within a data block the drive processes one 16-bit word every 2.5 μsec; data transfers take place through the computer's direct memory access channel, the firm said.

The disk pack subsystem is said to be supported by all of Data General's high-level language processors and disk-based operating systems.

## Sykesdisk Linked To DEC Systems

ROCHESTER, N.Y. – Software drivers to link the Sykesdisk floppy disk system with two Digital Equipment Corp. PDP-8 operating systems -- the 4K Disk Monitor System and OS/8 are available from Sykes Datatronics.

The Disk Monitor System driver allows existing 4K systems with limited I/O to become operating systems, according to the firm.

Diskettes written on Sykesdisk are compatible and interchangeable with IBM 3740 systems, the firm stated.

The drives add $50 to the price of Sykesdisk from the firm at 375 Orchard St., 14606.

## Nova, PDP-11 Interfaced To Data Disc Devices

SUNNYVALE, Calif. The Data Disc interface controller makes the company's 8400 Series disks hardware- and software-compatible with the Data General Nova and the Digital Equipment Corp. PDP-11 minis.

The controller, in conjunction with the 8430 disk, offers end users an opportunity to install 1M words of 8.5 msec memory into their systems for less than $10,000, the company said.

The firm is at 686 W. Maude Ave., 94086.

### 12K Fits on One Board

ENGLEWOOD, Colo. A 12K 16-bit word single-board semiconductor memory system for the Digital Equipment Corp. PDP-11 is available from Monolithic Systems Corp.

The random access based memory system is hardware- and software-compatible with the PDP-11, according to the firm. Access time is 500 nsec.

The memory board costs 1,995 from the firm at 14 Inverness Drive E., 80110.

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# Miniworld

## 'MAP' Speeds Arithmetic Processing

BURLINGTON, Mass. – The Macro Arithmetic Processors (MAP) from CSP, Inc. can help users do fast arithmetic processing of data without tying up their mainframes, according to the firm.

The MAP boxes process data in arrays and enhance the speed of multiplication, which is the basis of digital signal processing, a spokesman said.

CSP can interface the devices to most mini- and maxicomputers. The arithmetic part of a MAP device has its own memory, which users program through a Fortran callable subroutine, a spokesman noted.

### Three Models

There are three MAP models of different processing speeds. The MAP 100 costs $5,000 and can do a 1K Fast Fourier Transform in 60 msec; the MAP 200 costs $10,000 and takes 12 msec; and the MAP 300 costs $14,000 and benchmarks at 4.5 msec.

Deliveries are four to six months from the firm at 209 Middlesex Turnpike, 01803.

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# Miniworld

## Printer Outputs 300 Line/Min

IRVINE, Calif. – Printronix, Inc. has a 300 line/min multiple copy matrix printer that the firm said bridges the gap between conventional low-cost/low-performance matrix printers and the higher-cost/higher-performance drum/chain/train-type devices.

### With 'Any' Mini

The printer can be used with any minicomputer that can interface a Dataproducts 2230 printer, or Centronics or Data Printer models, according to a Printronix spokesman.

The device's printing mechanism, supported by scanning and decoding techniques similar to those of CRT alphanumeric displays, permits placement of uniform density dots on command. It can also be used as a plotter, according to the firm.

The Printronix 300 costs $3,975. Deliveries are scheduled to begin in the first quarter of 1975 from the firm at 17935 Sky Park Blvd., 92707.

## *Interrupts at Any Point*

## Console Helps Debug PDP-11 Programs

CHERRY HILL, N.J. – Formation Inc.'s Program Debug Console for Digital Equipment Corp.'s PDP-11 mini is said to allow users to stop or interrupt the system at any point for examination of its various elements and offer a backward look at the last 16 addresses that appeared on the Unibus.

### Stops Processor

Among its capabilities, the Program Debug Console will stop the processor on a specified address when a read or write is attempted, generate an interrupt when the processor accesses a specified address in a read or write mode and stop the processor when any interrupt occurs.

The 801 Program Debug Console is priced at $1,200 from the firm at One Computer Drive, 08003.

## Cartridge Disk Made for PDP-11

SUNNYVALE, Calif. – A cartridge disk system from Advanced Electronics Design (AED) is said to be compatible with Digital Equipment Corp.'s PDP-11 minicomputers.

All AED 2200 hardware, software and media are directly interchangeable with DEC's RK-11/RK-05, 03 system, AED said.

In an existing system, the AED 2200 can be intermixed with other cartridge disk hardware at will, the firm added.

The 2200 controller plugs directly onto the PDP-11 Unibus, and controller electronics are mounted on a single printed circuit board.

### Overlapped Operations

The controller can carry out overlapped operations and has nonprocessor request and direct memory access features. Average random move is 70 msec, and the data transfer rate is 11.1 μsec/word.

The Diablo disk drives used in the system are available in several variations with removable and fixed cartridges. The controller can operate up to four disk drives in any combination for a total of almost 5M 16-bit words.

Price of a basic AED 2200 system, including a single-spindle drive, removable cartridge and necessary connecting hardware, is under $6000. The firm is at 754 N. Pastoria St., 94086.

## CDI's Turnkey 'Opus III' Uses Basic, Fortran

DALLAS – Computer Development, Inc. has [illegible] a computer system designed to [illegible] with [illegible] needs in small and medium-sized firms.

The 16K [illegible] called Opus III supports Extended Basic and Computer Development's "Business Fortran," a spokesman said. The company [illegible] a wide range of application software, he added.

### Basic System

The basic system in addition has a desk typewriter and three cassette drives. Options include 100- to 600 line/min printers, tape drives, paper tape readers, 10M-character disk and a 2,000-character CRT.

An Opus 2000 system costs between $20,000 and $30,000 depending on peripherals, the spokesman said. Typical delivery is 30 days from the firm based at 13500 Midway Road, 75240.

## 'Quick-Writer' Handles Editing Cassette Data

CUPERTINO, Calif. – Versatec has introduced a word processing matrix printer that can print 500 char./sec from Redactron or Remington Rand automatic editing typewriter cassettes.

The machine can also print incoming data from remote automatic editing typewriters at data transmission speed, Versatec said.

The Versatec Quick-Writer costs $9,700 from the firm at 10100 Bubb Road, 95014.

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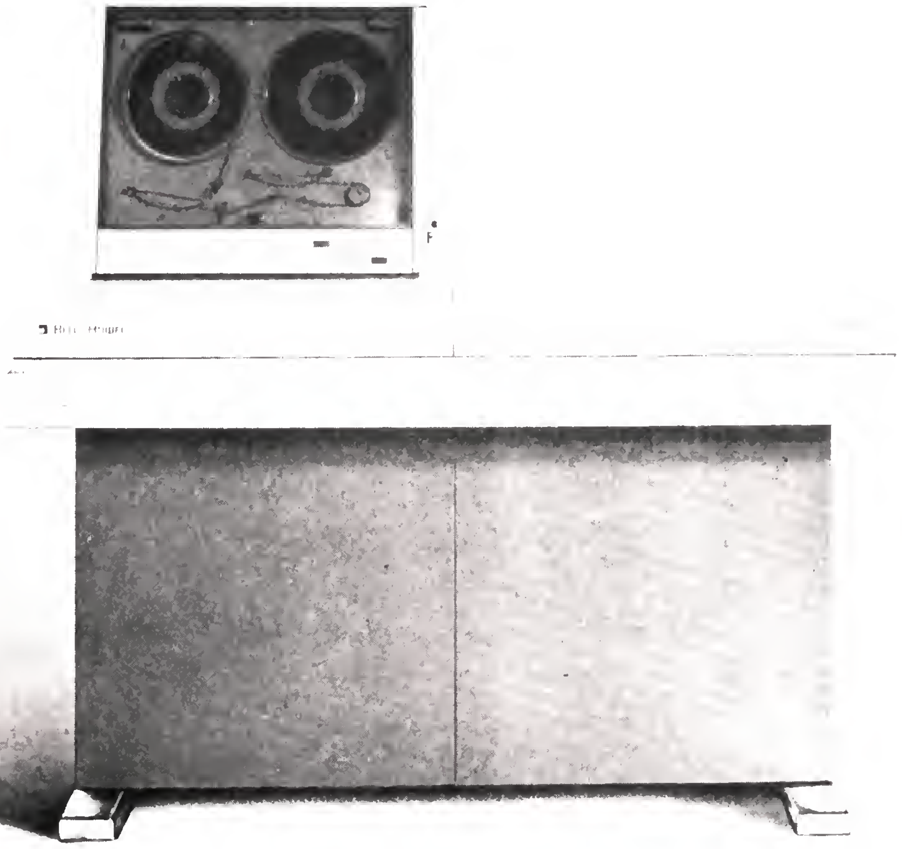

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The course will also cover general data communications topics, including intelligent terminals (performance and selection criteria), network software handlers (e g CICS) and network organization and design And, you'll learn about saving money using such innovative concepts as split-stream modems, remote-multiplexers/concentrators, diagnostics for fault isolation and front-end processors

All participants in this seminar will receive a 2-volume loose-leaf outline of all course materials (prepared by ICC Institute), a copy of "Data Modems Selection and Evaluation Guide" by Vess V Vilips and a "Data Communications and Teleprocessing Dictionary"

You should attend this seminar if you are currently involved in data communications on a management or operational level and wish to expand your knowledge of the field – or if your company will be going into this area in the near future

This seminar runs two days, and total cost, including workbook, reference materials, luncheons and continental breakfasts is $350, Additional registrants from the same company qualify for a reduced rate of $300 Current schedule is as follows

**Miami** Miami Marriott December 2-3

## Data Base Management

**A practical approach to the design and implementation of data base systems.**

The difference between an effective data base system and a waste of computer time and memory lies in effective planning, system selection and management And this course gives you both the information and the basic experience you need for the proper design and implementation of a data base system

Given in association with Leo J Cohen and Performance Development Corporation, this course covers a comprehensive list of topics, including:

- *the description and definition of the Data Base System Project.*
- *the development of a full-service analysis and system design*
- *optimum file organization and indexing techniques*
- *all available indexing techniques and their implementation*
- *all aspects of system management.*
- *and much more*

One of the key features of this course is the workshops, in which you'll apply what you've learned And before you're finished you'll have "done" a complete, on-line order entry / inventory management system

You should attend this seminar if you are (or will be) involved in the design and implementation of a data base system – whether as a DP Manager, Data Base Administrator, Planner, Analyst or Programmer.

This course runs for 3 days, and costs $350, including course materials, continental breakfasts and luncheons. Additional registrants from the same company qualify for a reduced rate of $300. Current schedule:

**Chicago** Playboy Towers November 18-20
**Denver** Denver Hilton December 9-11

## Contracting for Computers and EDP Support Services

**A seminar that can help you protect your EDP investment – and your system.**

In an industry that's famous for its "promise them anything" attitude, you need good, effective contracts from the vendors that supply your installation And this seminar gives you the information you need to get them It will show you how to protect your installation from late deliveries, inadequate equipment or services and the costly disruptions that they can cause

Course topics include the lease and purchase of computer systems, separate hardware and software – the purchase of time sharing, data processing services and consultation – and the use of facilities management

Under the personal instruction of Roy N Freed, a nationally known lawyer, author and expert in the field of computer law, you'll learn how to place yourself in a strong bargaining position, how to insure on-time delivery of exactly what you want, how to set reasonable performance standards for warranties – and much more You'll also receive a complete resource notebook, *including sample vendor contract forms*

You should attend this seminar if you are involved in the purchase of EDP equipment or services, whether as a corporate counsel, contract administrator, DP manager, consultant or officer of a using firm

Cost for the entire 2½ day seminar, including complete resource notebook, continental breakfasts, luncheons and coffee breaks is $295 00 The current schedule

**Chicago** Hyatt Regency O'Hare December 4-6

## How to Draft Effective Legal Agreements Relating to Computer Technology

**A one-day workshop for non-legal technical people**

For a variety of reasons, computer users and computer manufacturers often use non-legal people to draft agreements These agreements are used for specific transactions and as "standard forms", and they can cause significant problems. It's easy to overlook important legal points – especially if you're not a lawyer – and this workshop is designed to give you the basic knowledge you need to avoid the pitfalls

Conducted by Roy N Freed, course leader of our comprehensive contracting seminar, the workshop includes the following topics Purpose and functions of formal agreements; architecture of agreements; language caveats; use of forms; checklists and outlines; suggested writing style; sources of applicable legal rules; sources of assistance; and more.

Cost of the workshop, including resource notebook and lunch is $135 Current schedule:

**Boston** Sheraton Boston November 20th

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## Key-To-Disk Systems

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Data entry is a big problem – and a big headache – as every computer user knows And key-to-disk systems are one of the most popular methods of improving efficiency in this area So this course is designed to help you in the practical aspects of selecting, installing and making the best use of key-to-disk Topics include

- *key to-disk hardware and software*
- *starting a key to-disk system*
- *data entry system design*
- *key to-disk as a remote batch terminal*
- *operating a small key-to-disk system*
- *improving productivity*
- *trends in computer data entry – including multi media*

This seminar is lead by Lawrence Feidelman, President of Management Information Corporation, and one of America's leading experts on data entry All participants will receive a copy of "Data Entry Today", Management Information Corporation's authoritative publication on every aspect of data entry

You should attend this seminar if you are considering (or currently using) key-to-disk systems, Cost for the 3 day seminar is $350, including continental breakfasts, luncheons and all course materials Additional registrants from the same company are charged only $300
Current schedule

**New York City** Waldorf Astoria November 11-13

**To: Ed Bride, Vice President, Editorial Services, Computerworld**
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**NOTE: If time is short, you may reserve space at any seminar by calling collect. Call Marcia Hewett at (617) 965-5800.**

## *Small User Not a Threat*

# Larger Installed Base Means Growing Services Market

By Molly Upton
Of the CW Staff

NEW YORK – Rather than viewing as a threat the increased installed base of computers, especially small machines, and the growing sophistication of users, the DP services industry should realize these factors represent a larger and more challenging market, Drexel Burnham & Co.'s senior analyst Harry Edelson told attendees of the 41st Management Conference & Annual Meeting of the Association of Data Processing Service Organizations (Adapso).

Edelson

Bringing up a theme that was to recur within workshops, Edelson said "instead of looking at the small computer user as a threat, the industry should regard him as an important source of revenues and develop services tailored to his needs." The computer companies are educating and whetting the appetites of computer users, he added.

"Helping users achieve the maximum benefit from DP, irrespective of whether the hardware used is in-house or external, is the job of the DP services industry," he said.

Citing the customer bases of several firms as blue chip institutions with extensive in-house capabilities, which accounts for most of the DP service industry's revenues, Edelson said this "should be proof enough that computer proliferation is not the death knell but rather the life blood of the services industry."

### Smallness Suffers

Dividing the prospects of the DP services segment into long- and short-term, Edelson cautioned that although prospects for the future are bright, there may be difficulties in the short-term including a shakeout among small service bureaus.

In addition to "competition" from a growing installed base, the other factor seen as a threat in the long run is the possibility of saturation, he said. But after explaining his basic precept that the prosperity of the DP services and hardware industries are closely entwined and not mutually opposed to each other, Edelson noted the computer industry does not face saturation.

CW at Adapso

"Burgeoning uses for computers in the U.S., enormous overseas potential and phenomenal technological strides by the semiconductor industry make the prospect of imminent computer saturation highly unlikely," he said.

"Hardly anyone has a computer in his home; only one third of computers utilize communications facilities; and most challenging to the DP services industry, the computer, like the human mind, is being used only at about 5% of its ultimate potential."

### Recession More Serious

Edelson warned that the DP services industry would not be immune to the recession, for which his firm forecasts an 8% drop in general corporate profits in 1975 despite an amelioration of economic factors, such as a projected prime rate of 8% to 9% by the end of the first quarter of 1975.

In fact, a more serious threat to the DP services industry than either competition or saturation is posed by the economic situation.

However, because of the nature of this recession, which is tempered with inflation, and the idiosyncracies of the computer industry, the 1974 recession will have less of an impact than prior recessions on the DP industry and will be felt in 1975, he said.

Edelson explained the computer industry generally benefits from inflation, as DP is seen as a labor saving device used to combat climbing labor and production costs.

Inasmuch as the fortunes of the services segment are proportioned to those of the computer industry, "statistics show that annual gross revenues for both hardware and services have increased uninterruptedly, with service revenues growing about 50% faster," he said.

However, he cautioned, "the common wisdom that a drop in capital spending will divert customer DP expenditures from hardware to services has never been proven. If the current recession deepens, we will have an opportunity to see if the common wisdom holds up. Don't bet on it."

In the near term, with the impact of the 1974 slowdown hitting the DP industry in 1975, small firms will be more vulnerable than large firms.

Small service bureaus and time-sharing companies "are finding it increasingly difficult to remain small and, at the same time, economically viable," Edelson said. He predicted a continuing shakeout of the service bureau segment comparable to what already happened in the time-sharing area.

Small firms find it costs them more to borrow money, and it is harder to cut direct costs since equipment is already at minimal levels, he said. In addition, when things look bad, employees leave.

Small firms' stock prices are too low to raise equity. Interest rates are too high to raise debt. Software development costs must now be expensed as incurred. The cost of labor and supplies is climbing rapidly. Inflation is being licked, but primarily because the recession is worsening, he noted.

The alternatives facing small firms are to go out of business, merge or grow, but the latter is difficult, because "very few companies possess the managerial and financial skills that can serve to catapult them into the ranks of medium-sized companies," he said.

Although merging is a viable alternative, it is "not generally desirable at current depressed valuations."

Successful companies, he noted, have economies of scale on their side. "The incremental cost of providing repetitive services is negligible."

A small firm adding a computer feels a drain on earnings "since additional revenues cannot be generated fast enough and very little can be shifted from the overloaded computer."

Larger firms with several overloaded machines "can easily make a new computer profitable from the day it is installed by load shifting and normal growth," he explained.

In addition, big firms can spread the cost of program development over a larger number of accounts.

But growth can have its pitfalls, as several time-sharing firms found out this year. Upgrades or adding another make of equipment, mean concomitantly higher software development costs, lack of compatibility between machines, lower hardware reliability and an "inability to compensate for downtime because of the impossibility of shifting customer loads between different types of computers."

Despite growing pains, the interactive and remote batch markets continue to grow at about 30% per year. Almost all T/S and software companies saw their percentage of revenues from proprietary software rise, he said.

A distinguishing characteristic about the computer industry is that its gross statistics are largely biased by IBM, which is more affected by its product cycle than mere external factors such as war or depression, he said.

Edelson listed other features of the DP industry as seen by Wall Street.

The computer industry is "relatively" recession resistant by virtue of its large rental base and large order backlogs. The services industry, lacking these, does have some long-term contracts, but more importantly, "the cyclicality of the services industry is reduced somewhat by its dependent relationship to the acyclical computer industry."

Edelson pointed out that the hardware industry is multinational while the DP services industry is domestic. Use of excessively liberal accounting has largely been eliminated.

In addition, inventory profits in the DP industry have been moderate as prices have remained stable through benefit of cost reductions from improved technology.

The DP services industry has a great plus going for it in that it does not suffer from scarcity of materials and energy to the same extent as manufacturing companies.

Also, there has been a dramatic and steady decline in the cost of computing measured by price/performance ratios.

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# IBM Tells FCC It Will Give Proprietary Information to CML

WASHINGTON, D.C. – In its reply comments to the Federal Communications Commission (FCC), IBM revealed it will make available to the restructured CML Satellite Corp. some proprietary information and said CML's services would not be limited to users of IBM equipment.

IBM's reply urged prompt consideration of its application to become a 55% partner in the proposed restructuring of CML Satellite Corp. with Comsat General the other partner. Several firms, as well as government departments, have registered objections with the FCC.

While noting CML will be operated as a separate entity with separate books of account, separate officers, etc., IBM said "this does not, of course, mean that CML will not avail itself of the experience, knowledge and know-how of its corporate parents (Comsat General and IBM). For its part, IBM would consider itself remiss if it did not make available to the fledgling carrier useful information – including some proprietary information – that would enable CML better to serve users of information-handling systems.

"By the same token, IBM anticipates that Comsat General will make available to CML its experience in operating satellite systems."

Tackling the argument that IBM would use its entry into the satellite field to lock in users of IBM equipment, the reply stated "... the practices of an IBM-affiliated carrier will be scrutinized by competitors and by law enforcement agencies looking for even an appearance of discrimination or favoritism.

"As a matter of law and regulatory policy, CML would not be permitted to engage in discrimination or favoritism. Moreover, as a matter of enlightened self-interest, it would be essential for CML to configure its satellite system, to fashion its service offerings and to utilize technical characteristics that would make the system attractive, efficient and economical to users generally.

"It would make no economic sense for CML to limit its service to customers using IBM equipment. . . . Every effort will be made to assure that interconnection specifications and other technical arrangements are designed to meet the needs of data processing users generally – not just those with IBM equipment."

IBM's reply also refuted the argument voiced by some opponents that IBM and AT&T might split up the communications marketplace, with IBM servicing data needs and AT&T voice.

"Our studies have persuaded us that if a domestic satellite communications system is to be a viable business it must serve the complete communications needs of customers – voice, image and data. There is no way it can succeed without voice," IBM said.

IBM also noted in its reply that it has "no desire for a permanent position as majority owner of a satellite communications carrier and has joined with Comsat General in the intention, subject to a necessary Commission approval, to make available a substantial number of shares of CML common stock to other investors after CML has gained operational experience."

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# GSA Extends Dates For 168 Deliveries

By a CW Staff Writer

WASHINGTON, D.C. – Deadlines and requirements on a recently announced Social Security Administration solicitation for two IBM 370/168 computer systems have been changed. The original proposal was divided in half and the delivery date for the first 370/168 was set for Nov. 15 as originally planned, but the second was delayed until Dec. 13.

The changes, made in response to leasing firms' protests over the 10-day lead time in the original request, were announced in a mailgram issued by the General Services Administration (GSA), the agency coordinating the procurement.

Because of the 20-day delivery deadline after bid selection, computer leasing firms had accused the GSA of issuing "a virtually sole-source award to IBM."

To make the system still "easier to bid," the GSA deleted requests for four 3830 storage controls, 20 3330 disk drives and eight 3333 disk drives and will obtain them separately from the Automated Data Processing (ADP) Schedule Contract, according to a GSA spokesman.

In addition, delivery dates for a Model 7412 console and console attachment requested for each of the central processors "may be delayed," but not more than 60 days, according to the mailgram.

Opening date for the first 168 is now set for 3 p.m. Nov. 8, and for the second system, 3 p.m. on Nov. 22.

The GSA spokesman explained the Social Security Administration is in dire need of the equipment and has been since last spring. The request for additional equipment "got hung up in the privacy flack this summer," he explained.

The spokesman indicated, however, there was a need to balance the needs of the users in getting the equipment with those of the vendors in bidding, and therefore the solicitation was being modified "to give vendors a fair shake."

# Third-Party Audit at Service Bureau Can Save Money

NEW YORK – The use of a third-party audit can save service centers [illegible] and customers' auditors both time and money, [illegible] Alexander, auditor with Touche Ross and Co. and B[illegible] Batdorf, consultant, agreed at a recent Adapso workshop on "The Audit Guide."

Alexander explained that a third-party audit is performed by one set of auditors on system controls at a service bureau and the report can then be used by auditors engaged by customers of that service bureau's system.

Having one set of auditors troop through a center rather than several would mean a time, effort and, therefore, dollar savings to the center, Alexander said.

The third-party report describes in detail the system and attests that the controls described exist. It does not pass judgment on the adequacy of the system, as that determination can be made only after examination of the controls in effect at the user's site, he noted.

CPAs generally ignore the computer in instances where companies rely only moderately on DP, he said, noting they can audit around the computer. Without looking at the controls they can verify if the system functions accurately.

However, this is changing and auditors are increasingly relying on controls available through DP, he said.

In performing an audit, it is irrelevant to the CPA on whose computer the work is run. He warned that service bureaus will see more auditors in the future, whether engaged by a group to monitor one system or by individual customers.

Determining the necessity of auditing the computer's functions is a judgmental decision by the auditor. Criticality of the system to the user is one factor usually used in deciding, he said.

This increased demand by auditors could be a problem to service bureaus that don't have good documentation, he said.

Conversely, centers that do have good documentation and controls on their systems might help compensate for a user's rather sloppy internal controls.

## CW at Adapso

Where does responsibility for control lie? Alexander and Batdorf stressed it is important for a center and customer to define each party's responsibility.

Although Alexander acknowledged there may not be widespread instances of demand for a third-party audit, its use is growing. It is especially suited for regulated industries.

Touche Ross, he said, knows of 35 savings and loan institutions that realize a considerable savings by sharing the audit of one system which they all use without modification.

A guide to third-party audits, prepared by the American Institute of Certified Public Accountants is available through Adapso at 210 Summit Ave., Montvale, N.J.

# ISO Groups Meet, Okay Standards For Mag Tape

WASHINGTON, D.C. – The annual meetings of two International Standards Organization (ISO) technical groups on magnetic tape were held recently at the Washington headquarters of the Computer and Business Equipment Manufacturers Association.

Subcommittee 11 on computer magnetic tape approved for three-month ballot two specific standards – one on the 1/4 in. magnetic tape cartridge commonly referred to as the 3M style and a second proposal on the 0.150 in. magnetic tape cassette with complementary return-to-bias and four state recording.

Additionally, the committee started a project on flexible disks (recorded and unrecorded characteristics) and 1/2 in. recorded magnetic tape containing 6,250 char./in. with group coded recording. Presently the highest density standard for 1/2 in. tape is 1,600 char./in.

Attendees included delegates from Germany, Japan, The Netherlands, Switzerland, the UK, USSR, U.S. and the European Computer Manufacturers Association (Ecma).

Subcommittee 12 on instrumentation tapes completed and sent to ISO for final approval a draft international standard 1858 on general-purpose reels (76mm centerhole) for instrumentation and another draft standard for general-purpose instrumentation reel.

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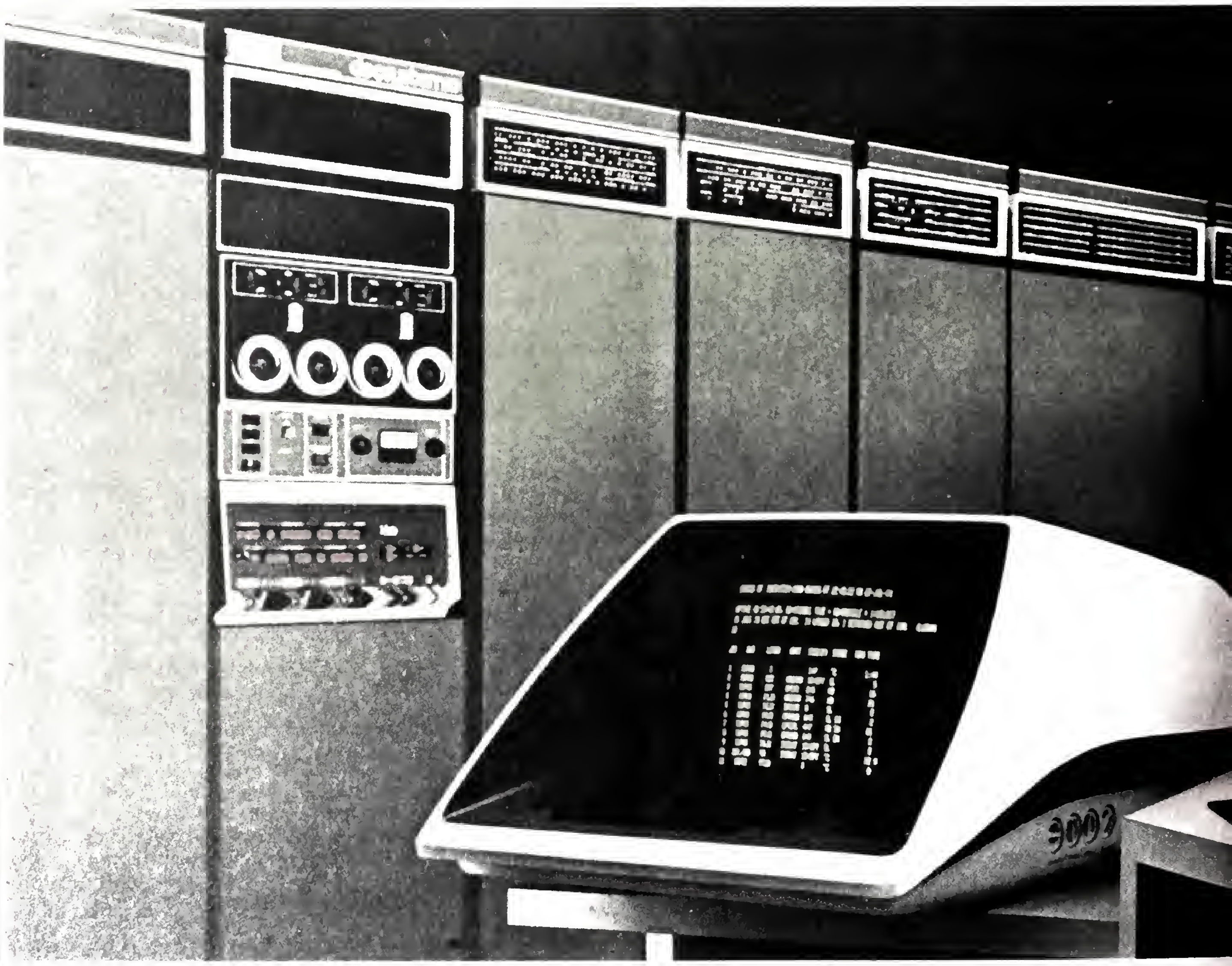

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# Contracts

**Sperry Univac** has received a contract from the Federal Aviation Administration to provide Arts III equipment for the Atlanta International Airport.

**Codex Corp.** has received a three-year contract to supply the Australian Post Office with 4,800 bit/sec modems. The post office will then provide the modems as part of a total data communications service to all users in Australia.

**Cipher Data Products** has received a contract from North Electric Co. for Cipher's F-4000 magnetic tape recorders for use in information updating.

**Cincinnati Milacron's Process Control Division** has awarded a contract to Decision Data Computer Corp. to supply card peripheral equipment for inclusion in a minicomputer-controlled system.

**Collins Radio Company of Canada Ltd.** has received a contract from Air Canada to provide a mini-based system to control its communications network.

# Saab-Scania Forms Subsidiary in U.S.

By Toni Wiseman

Of the CW Staff

NEW YORK — Saab-Scania, Swedish manufacturer of minicomputer-based automated teller systems, has formed a subsidiary to introduce its line of banking systems in the U.S.

Datasaab Systems will market computerized systems similar to those supplied by Saab-Scania for the Nordic project, which was designed to link over 2,000 bank branches in the four Scandinavian countries, said John Maghana, president of Datasaab.

In addition to the automated banking equipment and its related library of software, Datasaab will market lines of office computer systems, numerical control systems and process control equipment in the U.S. A line of proprietary biomedical instrumentation will also be marketed here.

During 1975, Maghana said, Datasaab will begin marketing a number of other electronic systems complementing its financial teller systems. In the banking field, the company will market data entry, arbitrage and inquiry systems for floor officers.

The company has looked at [illegible] proposed [illegible] Maghana said. "[illegible] our approach to POS is a very simple one. We don't want to compete with Singer or IBM."

## Already Functioning

In the U.S., Datasaab systems are already functioning at the [illegible] Savings Bank of New York," he noted. "Bank [illegible] will be installing a teller system in its [illegible] New York City branches [illegible] other banks are developing plans to install the system in their branches."

Datasaab's marketing approach centers around the concept of "face-to-face banking."

"Our aim is to make the customer feel more at ease and have the bank able to do more marketing of its services and not have to concentrate solely on numbers and data," Maghana said. "Personalized banking service is the key."

The heart of the banking system is a series of Datasaab minicomputers. A branch office may utilize one or more minis for on-line and off-line transaction processing at teller platform, officer and clerical work stations, he said.

The minis also function as concentrators for on-line communications to a central computer over telephone lines.

With the system, branch offices can have direct access, through the central mainframe, to all central information files, making possible immediate inquiries and transfer of data.

The system, Maghana said, can interface with any mainframe, and is compatible with IBM's Synchronous Data Link Communications (SDLC) systems and VS2 2.

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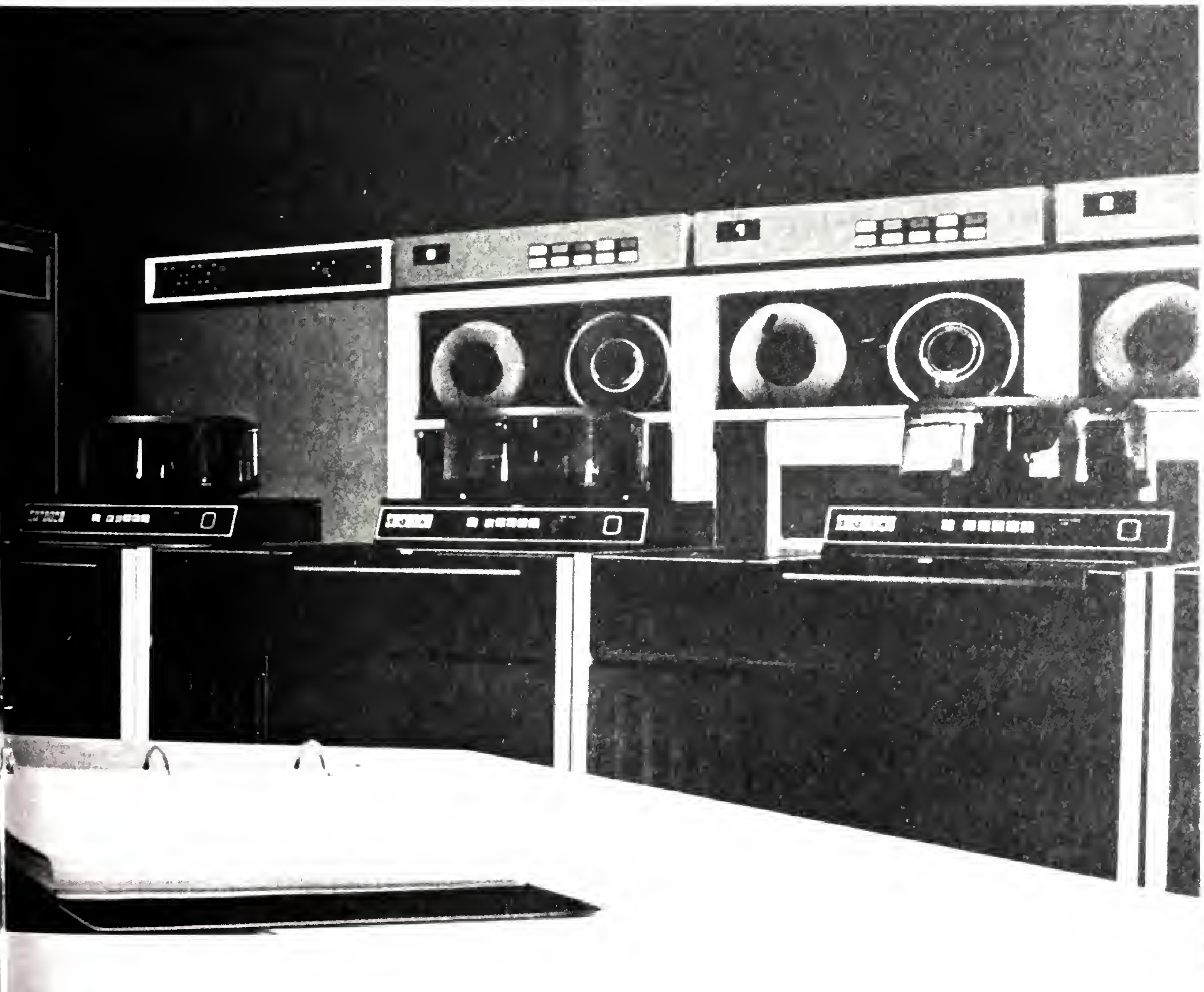


# Orders & Installations

## Tymshare Orders 40 Varian Systems

PALO ALTO, Calif. — Varian Data Machines has received an order for 40 V72 computers from Tymshare Inc.

The computers will join the 171 Varian 620 Series computers, 140 of which are used in Tymshare's international Tymnet network.

## Other Orders, Installations

Piggly Wiggly Southern, Inc., a chain of 53 supermarkets in Georgia, has ordered five NCR 255 systems to convert its stores to electronic point-of-service terminals. The systems include 40 NCR 255 terminals and five NCR 726 in-store computers.

Management Data Corp. has installed an Entrex 480 data entry system.

Gulf Oil Corp. has ordered for lease [illegible] item processing equipment from Recognition Equipment, Inc. to be installed at its travel card centers in Atlanta and Houston. The equipment will replace the Electronic Retina Computing Reader systems originally installed by REI in 1968.

**Central Carolina Farmers, Inc.**, an agricultural cooperative, has installed 12 NCR 250-7000 checkout terminals in its eight retail stores.

# Greater Buying from Private Sector Seen in Canada

By T.M. Whiteman

Special to Computerworld

TORONTO There is a new trend in the Canadian government's approach towards DP purchasing which means greater contributions from the private sector and curtailment of in-house activities where they are not cost-effective.

This was the key message of Jean-Pierre Goyer, minister of supply and services, in a recent speech to the Canadian Association of Data Processing Organizations.

The government has long been one of the largest users of DP services, he said, acquiring about $37 million worth of hardware last year and purchasing almost $16 million in software and services.

"We have moved towards more software and services and less hardware," said the minister. "The rate of increase in the use of services, including software, by the government is about 20 a year.

"Hardware requirements, on the other hand, are growing at only 10% per year."

### Master Plan

The impetus behind the new policy is the government's master plan which seeks to use DP as a resource in the development and operation of systems that support government programs and not as an end in itself.

The minister noted that the Department of Supply & Services is completing an inventory of computer hardware and software in the government and, as the details of this information are assembled and studied, "our computer resources can be better understood and areas of duplication should become apparent, allowing us to identify uneconomic utilization and to recommend areas for efficiency and saving."

Although the master plan has been in effect for only a year, some concrete results have been achieved, Goyer said.

"Rented computer systems used to be sent back to the vendor when they were no longer required," he said. "The computer inventory has allowed us to move systems from one department to another, resulting in the saving of millions of dollars because we have not lost rental credits."

Many examples of smaller savings are also evident, he said. "The awareness that several departments were planning to acquire the same type of software packages allowed my department to negotiate savings of about $250,000," he noted.

Another objective of the master plan calls for the government to meet its needs for DP services from the private sector, except where it is in the public interest or where it is more economical to provide these services internally.

As an indication of the application of this policy, the minister pointed to the increase in government expenditures for outside computer services.

Goyer noted that the government spent about $9 million in fiscal 1970. This rose to $12 million in 1973, and in the 1974 fiscal year expenditures are expected to amount to $15 million. He anticipates government expenditures for computer services in the private sector in 1975 to rise to approximately $18 million.

"As you can see, the amount will have doubled in five years, or show a rate of increase of 20% per year.

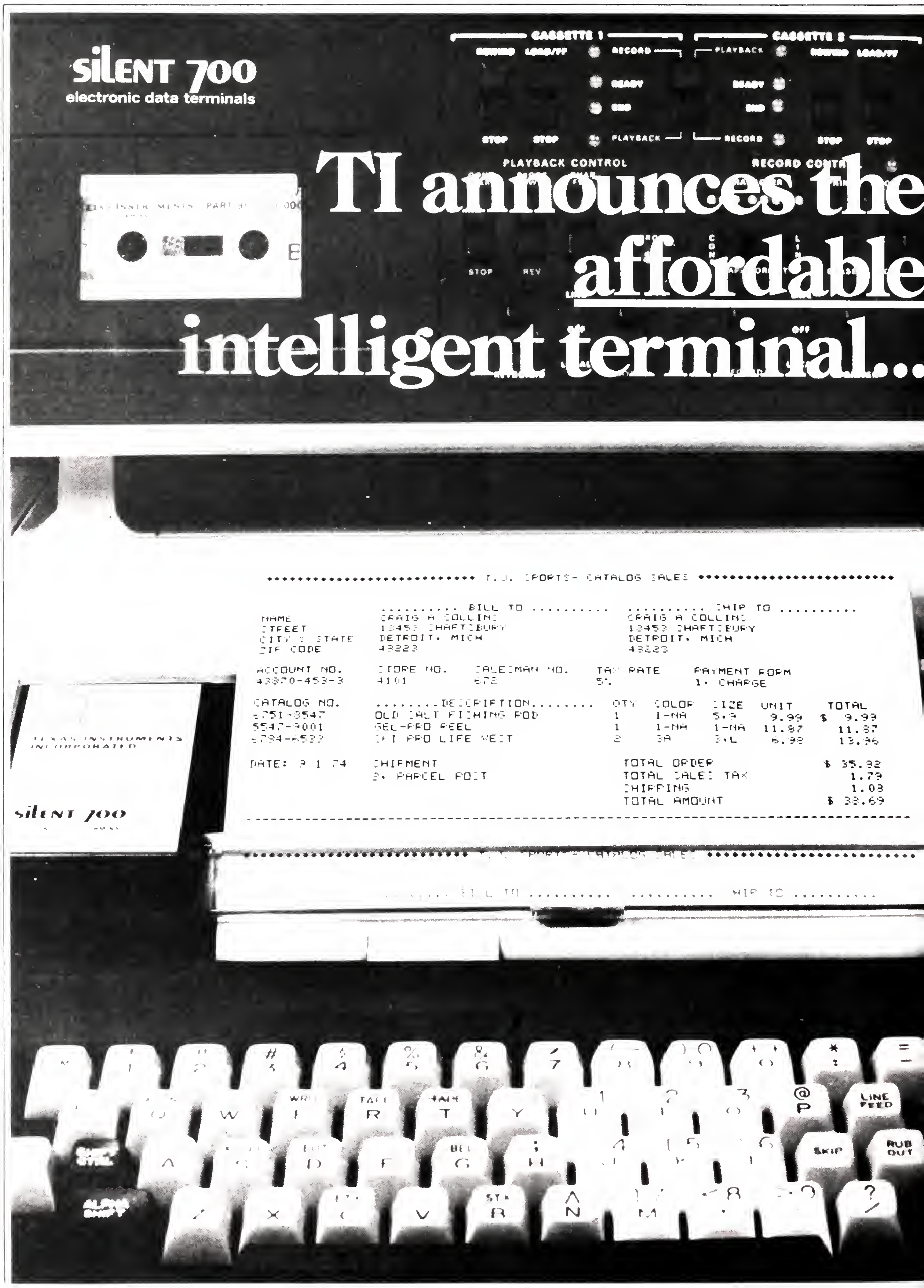
"The increase in work going to the private sector, based on total expenditures in the government for DP, can be appreciated when looking at the change in percentage of private sector versus in-house work," Goyer said. "In 1967, 6% went to the private sector, but last year this percentage had increased to 14% – a definite and positive trend."

The minister pointed out that his own department has also taken direct action to see that more work goes to the computer service industry by closing its own computer service bureau.

## International News

## Executive Corner

- James P. Campbell and Carl D. Carman have been elected vice-presidents of Data General Corp. Campbell has responsibility for domestic and international personnel and Carman will direct and coordinate engineering projects.
- Eugene F. Goodmaster has been promoted to vice-president of product development by Applied Data Processing, Inc. and will retain the functions of his former position as package and systems manager.
- Jeff F. Pan has been elected vice-president of communications and general manager of Systems Architect, Inc.'s Washington D.C. operations.
- Edward L. Cuddy has been promoted to vice-president of manufacturing at Computek, Inc.
- Fred Roberts has been appointed vice-president of marketing at Qantex.
- Pertec Corp. has elected Eugene R. White to its board of directors.
- Arnold Spitalny has been named president of Time Share Corp.



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************** T.J. SPORTS- CATALOG SALES **************
              .......... BILL TO ..........   .......... SHIP TO ..........
NAME          CRAIG A COLLINS                 CRAIG A COLLINS
STREET        13453 SHAFTSBURY                13453 SHAFTSBURY
CITY & STATE  DETROIT, MICH                   DETROIT, MICH
ZIP CODE      48223                           48223

ACCOUNT NO.   STORE NO.   SALESMAN NO.   TAX RATE   PAYMENT FORM
43870-453-3   4101        672            5%         1. CHARGE

CATALOG NO.   .........DESCRIPTION........   QTY  COLOR  SIZE  UNIT    TOTAL
5751-8547     OLD SALT FISHING ROD           1    1-NA   5.9    9.99  $ 9.99
5547-9001     SEL-PRO REEL                   1    1-NA   1-NA  11.87   11.87
5784-6533     SKI PRO LIFE VEST              2    3A     3.L    6.98   13.96

DATE: 9 1 74  SHIPMENT                       TOTAL ORDER             $ 35.82
              2. PARCEL POST                 TOTAL SALES TAX            1.79
                                             SHIPPING                   1.08
                                             TOTAL AMOUNT            $ 38.69
```

# Varian V-71 Offers 32K Memory

IRVINE, Calif. – Varian Data Machines' V-71, costing $8,000 each in quantities of 12, offers up to 32K words of memory.

Basic V-71 computers include 16K words of 1,200 nsec core memory, I/O bus with DMA, chassis, power supply and programmer console.

### Options

Options on the V-71 include a writable control store, power fail/restart, teletypewriter controller, automatic bootstrap loader for TTYs and a real-time clock.

The firm is at 2722 Michelson Drive, 92664.

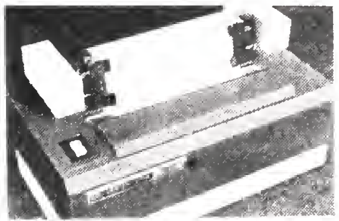
## CDC Unveils $2,350 Printer

MINNEAPOLIS – Control Data Corp.'s 9316 matrix printer handles one- to five-part, 4- to 16.75-in. forms. Front-impacting the forms eliminates hammer framing (blocking) and adjacent character ghosting and, for operators, the printer features constant visibility of the last line printed, CDC said.

A full-line buffer memory permits loading up to 132-character codes plus forms advance code and synchronous 173-char./sec printing of asynchronously received data.

Each of the CDC 9316 character sets is contained on a single read-only memory chip, allowing users to change character sets simply by unplugging and replacing the existing chip, the firm said.

The 9316 is priced at $2,350.


CDC 9316 Matrix Printer

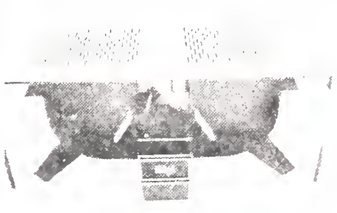
## Intel Adds Micro Systems

SANTA CLARA, Calif. – Intel has added four microcomputer component systems for processor and controller applications in prototype, short-production-run and experimental electronics equipment.

The MCS-4A aimed at replacing hard-wired logic subsystems, contains a 4004 CPU and five memory and peripheral circuits for $99. The MCS-8A, which handles a larger volume of data, has a 8008-1 CPU and 18 memory and peripheral circuits for $250.

The MCS-80A, with an 8080 CPU and 18 memory and peripheral circuits, costs $695. It has 10 times the throughput of the MCS-8A. The MCS-80B also uses an 8080 CPU, has 17 memory and peripheral circuits and uses static, rather than dynamic, RAMs.

It costs $495 from Intel at 3065 Bowers Ave., 95051.


Intel IMM 8-90 Paper Tape Reader

## OEM Products

## Intel Tape Reader Bows

SANTA CLARA, Calif. – The Intel IMM 8-90, a paper tape reader for Intellec 8 MOD 8 and 8 MOD 80 microcomputer development systems, transfers data 20 times faster than a standard ASR-33 teletypewriter tape reader, according to Intel.

### Transfer Rate

An asynchronous data transfer rate of 200 char./sec allows an 8K-byte program to be loaded into memory in one and one half minutes with the IMM 8-90. The reader is software- and hardware-compatible with all Intellec 8 systems, the firm said.

Resident monitor software includes a general-purpose tape reader driver that enables all system software to use the IMM 8-90 features. Interface cables and documentation are supplied.

The 8-90 is $975 from the firm at 3065 Bowers Ave., 95051

## Other OEM Products

Memory Technology, Inc.'s MTI 16/32 comprises an integrated CPU and MOS memory.

The processor is a stored program unit with a 16-bit fixed-word length that is program language-compatible with Data General Novas and Digital Computer Controls DCC minis, the firm said.

Up to 32K words can be directly addressed. The 32K memory requires two boards; the basic storage element is a 2K by 1 bit P-channel MOS RAM chip.

A 16K unit costs $2,500 in OEM quantities from 533 Boston Post Road, Wayland, Mass. 01778.

the new "Silent 700" programmable data terminal. $4,925

Now, intelligence in a terminal is truly affordable! The new "Silent 700*" Programmable Data Terminal combines powerful microprocessing capabilities with the proven "Silent 700" features... at virtually half the price of comparable intelligent terminals.

**Improved data entry efficiency**
The powerful and easy-to-use TICOL language allows the user to generate "fill-in-the-blank" data entry forms, automatically check data for correctness, perform standard arithmetic functions, and tailor data formats for the user's system. All this can be accomplished locally... without the aid of a central computer.

**Applications versatility**
As an intelligent communications terminal, the new "Silent 700" model is ideally suited for such applications as catalog order entry, remote batch processing, inventory data collection and reporting, and virtually all kinds of branch office data preparation.

**Single data entry package**
The compact desktop unit contains all the standard features...dual magnetic tape cassettes; quiet, non-impact 30 characters-per-second printing; USASCII keyboard with built-in 10-key numeric cluster; plus a hard-working microprocessor and 10K of memory.

**Communications flexibility**
Data may be transmitted at rates up to 120 characters-per-second, either simultaneously with new data preparation or unattended at night. To add both flexibility and security to communications systems, you have a choice of switch-selectable ACK/NAK block or continuous transmission communications protocols...and multidrop or dial-up line disciplines. Options include answerback memory, internal modem and a reverse channel feature.

The new "Silent 700" Programmable Data Terminal has a low, quantity-one purchase price of $4925. Economical monthly lease rates range from $175 to $205, including maintenance.

For more information, contact your nearest TI office listed below or Texas Instruments Incorporated, P. O. Box 1444, Houston, Texas, 77001, (713) 494-5115, ext. 2126.

Arlington, Va (703) 527 2800 · Atlanta, Ga (404) 458 7791 · Boston, Mass (617) 890 7400 · Chicago Ill (312) 671 0300 · Clark N J (201) 574 9800 · Cleveland Oh (216) 464 2990 · Dallas Tx (214) 238 5318 · Dayton Oh. (513) 253-6128 · Denver, Co (303) 751-1780 · Detroit Mich (313) 353 0830 · Hamden Conn (203) 281 0074 · Houston Tx (713) 777 1623 · Huntsville Ala (205) 837 7530 · Indianapolis Ind (317) 248 8555 · Milwaukee, Wis. (414) 475-1690 · Minneapolis, Minn (612) 835 5711 · New York N Y (212) 541 9540 · Orange Ca (714) 547 9221 · Orlando Fla (305) 644 3535 · Philadelphia, Pa (215) 643 6450 · Phoenix Az (602) 249-1313 · Rochester, N Y (716) 461 1800 · San Francisco Ca (408) 732 1840 · Seattle Wash (206) 455 1711 · Amstelveen Holland 020 456256 · Bedford England 58701 · Beirut Lebanon 353188 · Copenhagen Denmark (01) 917400 · Essen, Germany 02141/20916 · Frankfurt, Germany 0611 39 9061 · Friesing Germany 08161 7411 · Manchester England 33411 · Milano Italy 68 034 · Montreal Canada (514) 332 3552 · Paris France (1) 630-2343 · Stockholm Sweden 67 98 35 · Sydney S Australia 837 015 · Toronto Canada (416) 889 7373 · Tokyo Japan 402 6181

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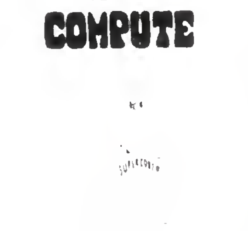

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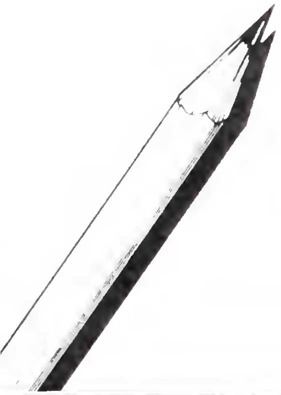

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Manager to coordinate and lead development of academic computer usage. Advanced degree plus several years programming, consulting and university computing experience required. System 370/135 — VS1 installed. Salary commensurate with experience. Send resume to: **Mr. William Clark, Director, Personnel and Staff Benefits, Northern Michigan Univeristy, Marquette, Michigan 49855**. *An equal opportunity employer.*

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The Computer Center serves a campus of nine thousand students, and fourteen hundred staff with administrative and academic computation service based on an IBM 370/158. Substantial services are also provided to more than a dozen other campuses in the State University through a growing telecommunications system.

The positions require an undergraduate degree in an area applicable to computer science, business administration, or academic research and instruction. Three to five years of experience in analysis and programming for areas similar to these academic disciplines are also required. A depth of experience in data base management, telecommunications, or customer contact would be additional desirable specialties.

The Binghamton area offers exceptional opportunities for living and professional growth. The University is located near good schools and a wide variety of recreational opportunities. Several major computer-based manufacturing firms provide continuing professional crossfeed. Commuting rarely takes more than ten minutes.

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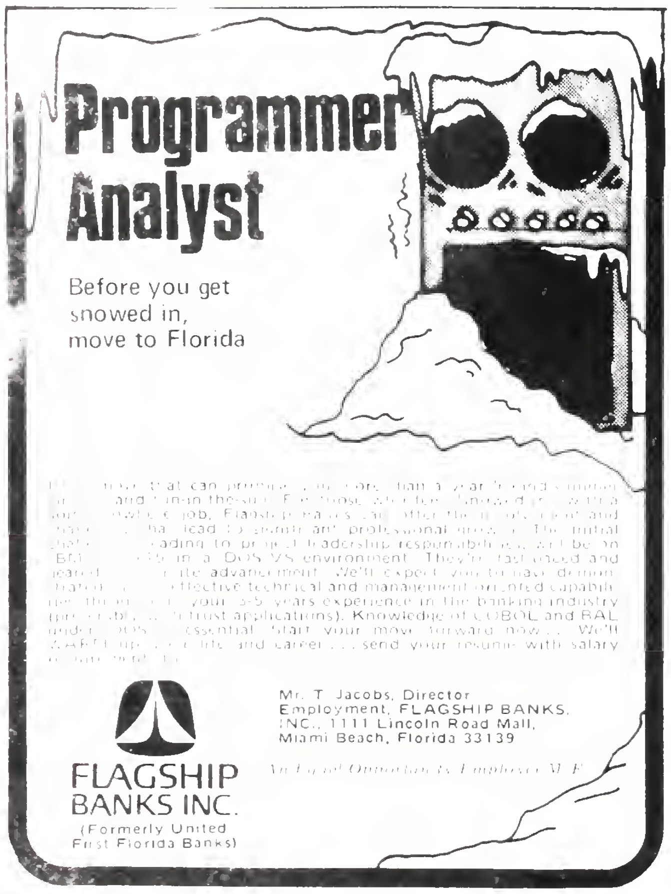

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Dallas, Texas 75207

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Detroit, Michigan 48202

**HARTFORD**
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Hartford, Connecticut 06105

**MINNEAPOLIS/ST. PAUL**
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Minneapolis, Minnesota 55402

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**PITTSBURGH**
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## COMPUTER TECHNICIANS

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*For details write:*

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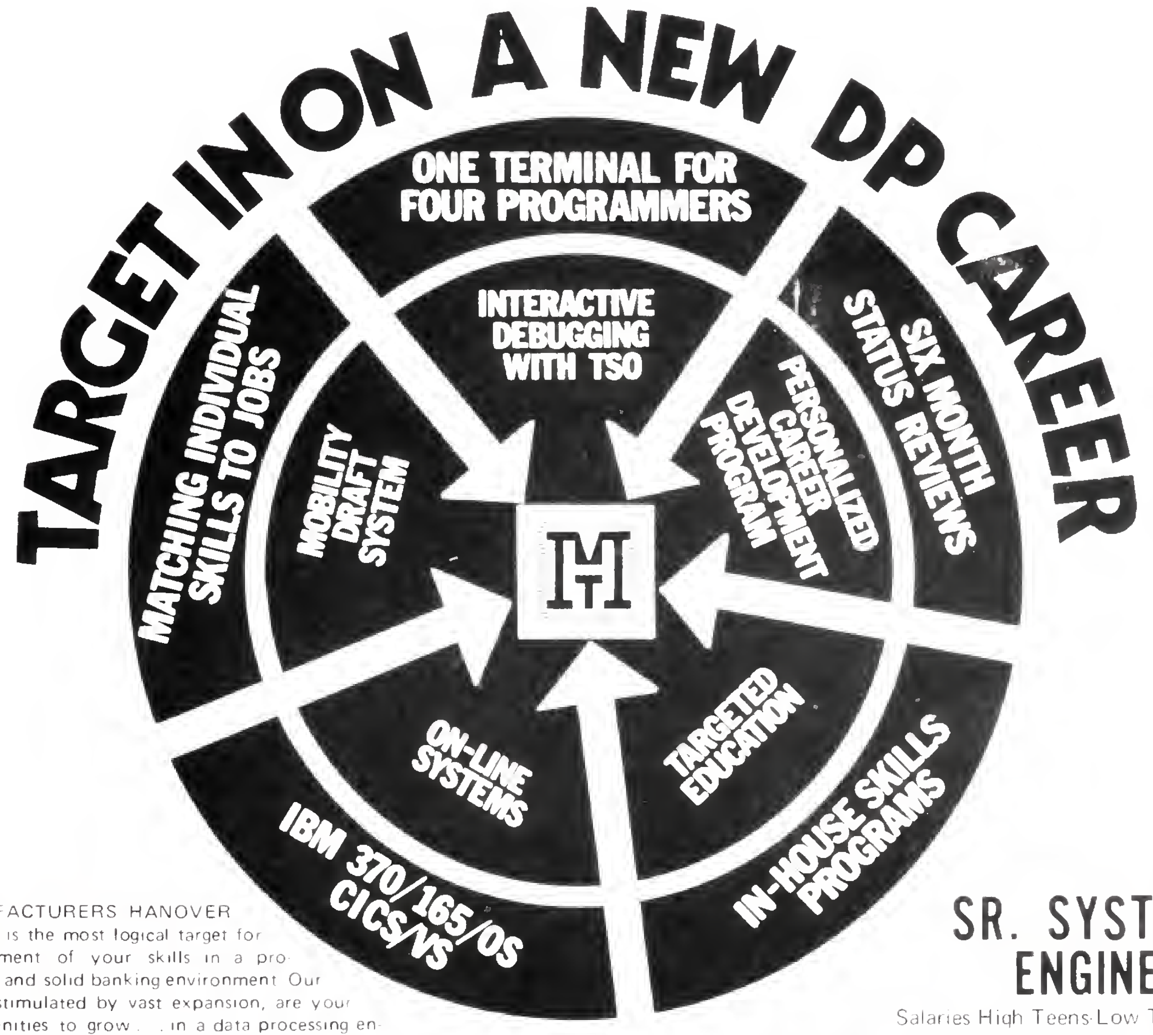
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### 1st Quarter Net Up

# DEC Calls '74 Recession 'Worse'

By Nancy French

Of the CW Staff

BOSTON – How does the present recession compare to the recession of 1970-71?

"It'll be worse," said Kenneth H. Olsen, president of Digital Equipment Corp. (DEC), at that company's annual stockholders meeting here.

Olsen made the judgment, he said, "based on inflation and a look at both years' gross national product (GNP).

"In 1971," Olsen said, "the GNP was flat, with inflation at 5%. This year, GNP is expected to be negative – as much as 3%, with 10% inflation."

But although it appears the economy will not support the unusually large growth rate of last year, and despite severe changes that are bound to occur, "DEC plans to take advantage of those changes," Olsen said, predicting "significant" growth.

"Since the last recession, the market has matured," he explained. During the last recession only small underfinanced companies were exploring the minicomputer market.

Olsen also said DEC was "very dependent on time-sharing utilities at the time.

DEC now enjoys a broad base of customers in all computer applications, according to Olsen, and the company's present time-sharing customers, the ones that survived the last recession are "much more stable."

During the last recession, the company was "way behind in production – we didn't have the products we needed," he said.

Although the growth in order rate for small computers has slowed recently, Olsen attributed it to DEC's immediate delivery policy. "OEM customers have reduced their inventory policy," he explained.

Orders for large computers are continuing to grow, with the Decsystem-10 and the PDP-15 achieving "planned goals for the quarter," Olsen said.

DEC expects to tap a previously unexplored source of profits – the peripherals field, with this summer's announcement of two new terminals, the VT50 DECscope and the LA 36 DECwriter II.

### Sales Reach $111 Million

DEC announced sales and earnings for the first quarter of the fiscal year ending June 28.

Sales reached $111.8 million in the first quarter ended Sept. 28, compared with $81.5 million in the year-ago period, an increase of 37%.

Net earnings for the quarter amounted to $7.5 million or 64 cents a share compared with $6.5 million or 58 cents a share in the year-ago quarter.

# Sanders Moves to Counter Losses

NASHUA, N.H. – Sanders Associates lost $19.2 million during the year as a direct result of "monopolistic marketing practices" practiced by IBM, Royden C. Sanders Jr., president, told shareholders recently.

Because of IBM's selection of Sanders Data Systems Division for "competitive retaliation," lease terminations of Sanders 620/720 terminal line have increased significantly and new orders fell "below expectations," he claimed.

Both factors contributed to the loss and created a surplus inventory that caused a $4.8 million write-off to reduce 620/720 inventories to "net realizable value."

To counteract these results, Sanders said the company has instituted a new 48-month noncancellable lease purchase plan, enabling customers to take title to their terminal equipment for one extra month's payment after the 48 months have elapsed.

The firm has also "initiated a defensive engineering program" so Sanders' terminal designs "will anticipate the effects of future IBM interface manipulations," Sanders said.

The new 8171 and 8172 terminals improve on features of the IBM 3270 and are part of a corporate program to standardize products, he said.

Despite the losses, Sanders said he was optimistic about the future of terminal-oriented distribution processing systems.

Sanders said his company is going to file an antitrust complaint against IBM "within 30 days," but he assured stockholders that the suit would not affect other corporate operations.

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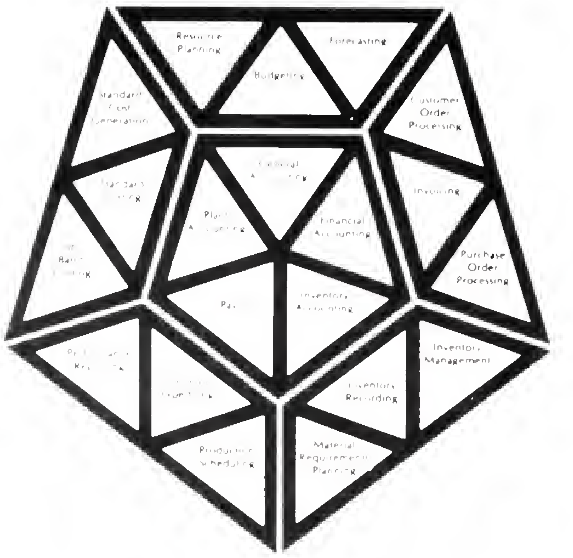

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## $90 Million Write-Off

# GTE Discontinues Lines After Heavy Loss

STAMFORD, Conn. - GTE Corp. has decided to discontinue three unprofitable product lines in its Information Systems Division and to take a $90 million write-off in the third quarter against costs associated with the discontinuation.

The lines being cut are the entire 5000 series of hard-copy terminals, the LC 720 key-to-disk unit that came with the acquisition of Logic Corp. about a year ago and the IS 7000 stand-alone video display.

The Mountain View (Calif.) facility, site of manufacturing for the 5000 series, is being shut down, a spokesman said, but added current commitments to customers will be satisfied.

GTE Information Systems will continue its brokerage information services. The Programming Methods Division and Federal Division will also be continued.

"An announcement near the end of the third quarter of a new equipment offering by a major competitor in the data communication product business, followed by a reevaluation of the profit opportunities in this business compared with alternate investment opportunities in our established businesses, brought about our decision to discontinue GTE Information Systems' participation in the hard-copy terminal and certain other data communications lines," said Leslie H. Warner, GTE chairman.

Although Information Systems' revenues more than doubled between 1970 and the end of 1973 to total over $75 million, losses diluted the firm's earnings in 1971 and again in 1972, he said.

"A loss of $19.9 million was reported in 1973. Notwithstanding continued efforts to improve operations of GTE Information Systems, losses of more than $11 million were incurred in the first six months of this year," Warner added.

The third-quarter charge of $90 million resulted in a loss for the third quarter and a considerable reduction in earnings for the nine months.

Profit from operations in the quarter was $81.9 million or 68 cents a share compared with $87.7 million or 74 cents a share in the year-ago period.

With the $90 million charge, the third quarter showed a loss of $15.6 million compared with earnings of $81.7 million a year ago.

Revenues totaled $1.43 billion, up 11% from the $1.29 billion in the same quarter last year.

Nine-month earnings reflecting the charge totaled $152.8 million or $1.27 a share compared with $240.6 million or $2.03 a share last year. Revenues were $4.15 billion.

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| Revenue | 10,197,000 | 6,709,000 |
| Tax Cred | 395,000 | 227,000 |
| Earnings | 838,000 | 473,000 |

a-Reflects the changes in reclassification of common stock and a one-for-four stock split.

**ITEL**
Three Months Ended Sept. 30

| | 1974 | a1973 |
|---|---|---|
| Shr Ernd | $.37 | $.37 |
| Revenue | 35,500,000 | 29,000,000 |
| Disc Op | ..... | (100,000) |
| Tax Cred | 100,000 | 1,100,000 |
| Earnings | 2,800,000 | 2,800,000 |
| 9 Mo Shr | .96 | .71 |
| Revenue | 104,500,000 | 65,000,000 |
| Disc Op | ..... | (100,000) |
| Tax Cred | 400,000 | 2,100,000 |
| Earnings | 7,300,000 | 5,300,000 |

a-Restated.

**NCR**
Three Months Ended Sept. 30

| | 1974 (000) | 1973 (000) |
|---|---|---|
| aShr Ernd | $.81 | $.70 |
| Revenue | 488,106 | 438,045 |
| Earnings | 19,924 | 16,472 |
| a9 Mo Shr | 2.13 | 1.60 |
| Revenue | 1,352,615 | 1,238,853 |
| Earnings | b51,825 | 37,286 |

a-Fully diluted. b-Inlcudes gain from the sale of timberlands in 1974.

**NUCLEAR DATA**
Three Months Ended Aug. 31

| | 1974 | 1973 |
|---|---|---|
| Shr Ernd | $.24 | $.36 |
| Revenue | 5,577,659 | 4,703,369 |
| Spec Cred | 98,000 | 90,000 |
| Earnings | 208,795 | 301,215 |
| 6 Mo Shr | .56 | .61 |
| Revenue | 10,627,023 | 9,388,384 |
| Spec Cred | 186,000 | 130,000 |
| Earnings | 480,328 | 520,075 |

**RAPIDATA**
Three Months Ended Sept. 30

| | 1974 | 1973 |
|---|---|---|
| Shr Ernd | $.09 | $.09 |
| Revenue | 2,933,506 | 2,413,105 |
| Earnings | 157,740 | 170,789 |
| 9 Mo Shr | .18 | .36 |
| Revenue | 8,384,369 | 6,965,826 |
| Earnings | 329,647 | a669,073 |

a-Includes a $78,000 credit and a $28,000 charge related to a proposed acquisition that was terminated.

**SIGNETICS**
Three Months Ended Aug. 6

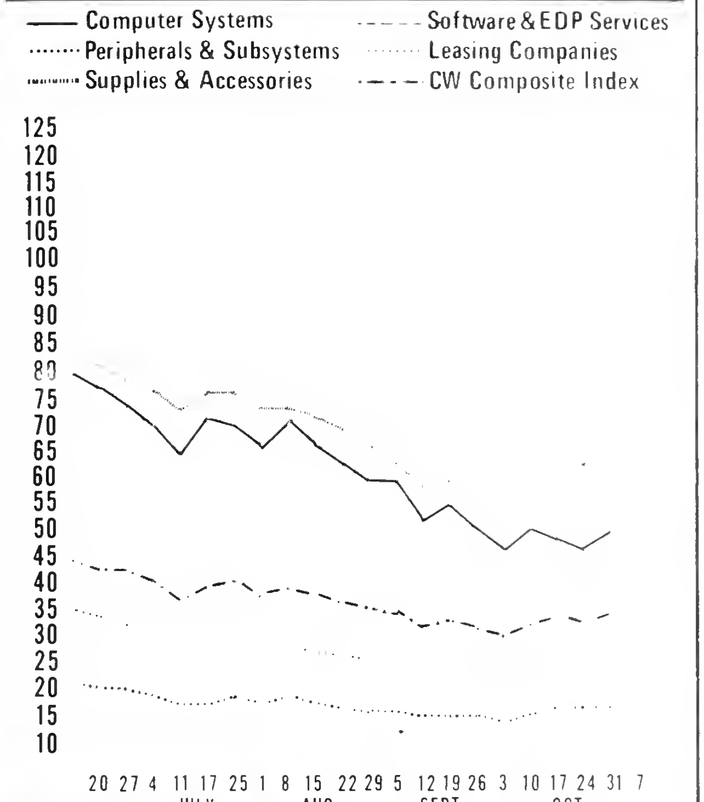
| | 1974 | 1973 |
|---|---|---|
| Shr Ernd | ..... | $.66 |
| Revenue | $35,197,000 | 30,560,000 |
| Tax Cred | ..... | 1,113,000 |
| Earnings | (3,176,000) | 2,825,000 |
| 9 Mo Shr | .31 | 1.30 |
| Revenue | 101,205,000 | 68,344,000 |
| Tax Cred | 437,000 | 2,144,000 |
| Earnings | 1,709,000 | 5,519,000 |

**BUNKER RAMO**
Three Months Ended Sept. 27

| | 1974 | 1973 |
|---|---|---|
| Shr Ernd | $.17 | $.33 |
| Revenue | 79,413,159 | 77,545,911 |
| Earnings | 1,636,229 | 2,678,032 |
| 9 Mo Shr | .70 | .94 |
| Revenue | 238,716,053 | 215,986,709 |
| Spec Chg | ..... | a640,471 |
| Earnings | 5,984,520 | 7,826,669 |

a-Cumulative effect on prior years of accounting change.

## COMPUTERWORLD Computer Stocks Trading Indexes



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# Computerworld Stock Trading Summary

All statistics compiled, computed and formatted by
TRADE★QUOTES, INC.
Cambridge, Mass. 02139

COMPUTER SYSTEMS

| EXCH | | PRICE 1974 RANGE (1) | CLOSE OCT 31 1974 | WEEK NET CHNGE | WEEK PCT CHNGE |
|---|---|---|---|---|---|
| N | BURROUGHS CORP | 63-217 | 83 5/8 | +6 5/8 | +8.6 |
| O | COMPUTER AUTOMATION | 4- 14 | 3 7/8 | + 1/8 | +3.3 |
| N | CONTROL DATA CORP | 13- 38 | 14 1/8 | + 3/8 | +2.7 |
| N | DATA GENERAL CORP | 13- 38 | 17 | +2 7/8 | +20.3 |
| O | DATAPOINT CORP | 7- 15 | 7 3/4 | 0 | 0.0 |
| O | DIGITAL COMP CONTROL | 2- 5 | 2 3/8 | + 1/8 | +5.5 |
| N | DIGITAL EQUIPMENT | 51-121 | 57 | +5 3/4 | +11.2 |
| N | ELECTRONIC ASSOC. | 2- 3 | 1 3/4 | 0 | 0.0 |
| A | ELECTRONIC ENGINEER. | 5- 11 | 5 3/4 | 0 | 0.0 |
| N | FOXBORO | 19- 48 | 27 1/2 | +2 1/4 | +8.9 |
| O | GENERAL AUTOMATION | 12- 40 | 14 1/2 | +2 1/2 | +20.8 |
| O | GRI COMPUTER CORP | 1- 2 | 1/8 | 0 | 0.0 |
| N | HEWLETT-PACKARD CO | 58- 90 | 65 5/8 | -1 5/8 | -2.4 |
| N | HONEYWELL INC | 22- 86 | 22 1/4 | -3 | -11.8 |
| N | IBM | 152-251 | 189 1/8 | +7 7/8 | +4.3 |
| O | INTERDATA INC | 8- 22 | 15 1/2 | +2 1/4 | +16.9 |
| O | MICRODATA CORP | 2- 5 | 2 1/8 | + 1/8 | +6.2 |
| N | NCR | 17- 40 | 17 3/8 | + 1/8 | +0.7 |
| N | RAYTHEON CO | 21- 39 | 26 1/2 | +4 1/8 | +18.4 |
| N | SINGER CO | 12- 40 | 12 1/2 | - 1/2 | -3.8 |
| N | SPERRY RAND | 24- 44 | 29 7/8 | +2 7/8 | +10.6 |
| A | SYSTEMS ENG. LABS | 1- 3 | 1 1/4 | 0 | 0.0 |
| N | TEXAS INSTRUMENTS | 60-115 | 73 1/4 | +8 | +12.2 |
| O | ULTIMACC SYSTEMS INC | 1- 2 | 5/8 | + 1/8 | +25.0 |
| N | VARIAN ASSOCIATES | 6- 13 | 6 7/8 | + 1/8 | +1.8 |
| N | WANG LABS. | 7- 20 | 9 1/2 | 0 | 0.0 |
| N | XEROX CORP | 61-127 | 72 7/8 | +3 1/4 | +4.6 |

LEASING COMPANIES

| EXCH | | PRICE 1974 RANGE (1) | CLOSE OCT 31 1974 | WEEK NET CHNGE | WEEK PCT CHNGE |
|---|---|---|---|---|---|
| O | BRESNAHAN CORP. | 2- 2 | 2 1/8 | 0 | 0.0 |
| O | COMDISCO INC | 1- 7 | 1 1/4 | - 1/8 | -9.0 |
| A | COMMERCE GROUP CORP | 3- 6 | 2 3/4 | - 1/8 | -4.3 |
| O | COMPUTER EXCHANGE | 1- 1 | 1/8 | 0 | 0.0 |
| A | COMPUTER INVSTRS GRP | 1- 4 | 1/2 | - 1/8 | -24.9 |
| O | COMP. INSTALLATIONS | 1- 1 | 1/4 | 0 | 0.0 |
| M | DATRONIC RENTAL | 1- 1 | 3/4 | 0 | 0.0 |
| A | DCL INC | 0- 1 | 3/8 | 0 | 0.0 |
| N | DPF INC | 2- 5 | 2 5/8 | 0 | 0.0 |
| O | EDP RESOURCES | 2- 3 | 3 1/4 | 0 | 0.0 |
| A | GRANITE MGT | 1- 3 | 7/8 | - 1/8 | -12.5 |
| A | GREYHOUND COMPUTER | 2- 6 | 2 1/2 | - 1/4 | -9.0 |
| A | ITEL | 3- 6 | 4 1/2 | + 1/2 | +12.5 |
| N | LEASCO CORP | 5- 12 | 8 5/8 | + 3/8 | +4.5 |
| O | LEASPAC CORP | 0- 2 | 1/2 | + 1/8 | +33.3 |
| O | LECTRO MGT INC | 1- 1 | 1/8 | - 1/8 | -50.0 |
| O | NPG INC | 1- 5 | 2 1/2 | 0 | 0.0 |
| A | PIONEER TEX CORP | 2- 10 | 3 | 0 | 0.0 |
| A | ROCKWOOD COMPUTER | 1- 1 | 1/2 | - | -11.1 |
| N | U.S. LEASING | 5- 24 | 10 1/4 | +1 1/8 | +12.3 |

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH
L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

SOFTWARE & EDP SERVICES

| EXCH | | PRICE 1974 RANGE (1) | CLOSE OCT 31 1974 | WEEK NET CHNGE | WEEK PCT CHNGE |
|---|---|---|---|---|---|
| O | ADVANCED COMP TECH | 1- 2 | 3/4 | 0 | 0.0 |
| A | APPLIED DATA RES. | 1- 3 | 1 1/4 | 0 | 0.0 |
| O | APPLIED LOGIC | 1- 1 | 1/8 | 0 | 0.0 |
| N | AUTOMATIC DATA PROC | 21- 57 | 34 1/4 | +6 1/4 | +22.3 |
| O | BRANDON APPLIED SYST | 1- 1 | 1/4 | 0 | 0.0 |
| O | CENTRAL DATA SYSTEMS | 4- 6 | 3 | 0 | 0.0 |
| O | COMPUTER DIMENSIONS | 1- 3 | 1 1/2 | 0 | 0.0 |
| O | COMPUTER HORIZONS | 1- 5 | 1 1/4 | 0 | 0.0 |
| O | COMPUTER NETWORK | 1- 2 | 1 | 0 | 0.0 |
| N | COMPUTER SCIENCES | 2- 4 | 2 1/4 | - 1/4 | -10.0 |
| O | COMPUTER TASK GROUP | 1- 1 | 1/2 | 0 | 0.0 |
| O | COMPUTER TECHNOLOGY | 1- 1 | 1/2 | 0 | 0.0 |
| O | COMPUTER USAGE | 2- 4 | 2 3/4 | 0 | 0.0 |
| O | COMRESS | 1- 1 | 1/4 | - 1/8 | -33.3 |
| O | COMSHARE | 2- 4 | 2 3/8 | + 1/4 | +11.7 |
| N | CORDURA CORP | 1- 4 | 1 5/8 | 0 | 0.0 |
| O | DATATAB | 1- 3 | 1 1/4 | 0 | 0.0 |
| A | ELECT COMP PROG | 1- 1 | 1/8 | 0 | 0.0 |
| N | ELECTRONIC DATA SYS. | 11- 25 | 13 1/4 | +1 | +8.1 |
| O | INFONATIONAL INC | 1- 2 | 1/4 | 0 | 0.0 |
| O | I.O.A. DATA CORP | 1- 1 | 1/4 | 0 | 0.0 |
| O | IPS COMPUTER MARKET. | 1- 1 | 1/2 | 0 | 0.0 |
| O | KEANE ASSOCIATES | 2- 4 | 1 3/4 | + 3/8 | +27.2 |
| O | KEYDATA CORP | 1- 6 | 1 7/8 | 0 | 0.0 |
| O | LOGICON | 2- 5 | 2 1/2 | + 3/8 | +17.6 |
| A | MANAGEMENT DATA | 1- 2 | 1 1/8 | 0 | 0.0 |
| O | NATIONAL CSS INC | 7- 37 | 7 1/2 | + 1/2 | +7.1 |
| O | NATIONAL COMPUTER CO | 1- 1 | 1/4 | 0 | 0.0 |
| A | ON LINE SYSTEMS INC | 18- 30 | 19 1/8 | - 1/8 | -0.6 |
| N | PLANNING RESEARCH | 2- 3 | 2 3/8 | 0 | 0.0 |
| O | PROGRAMMING & SYS | 1- 1 | 5/8 | 0 | 0.0 |
| O | RAPIDATA INC | 1- 5 | 2 | - 1/4 | -11.1 |
| O | SCIENTIFIC COMPUTERS | 1- 1 | 5/8 | 0 | 0.0 |
| O | SIMPLICITY COMPUTER | 1- 1 | 5/8 | + 1/8 | +25.0 |
| O | TCC INC | 1- 1 | 1/8 | 0 | 0.0 |
| O | TYMSHARE INC | 6- 12 | 8 3/8 | + 7/8 | +11.6 |
| O | UNITED DATA CENTER | 2- 4 | 2 3/4 | + 1/4 | +10.0 |
| A | URS SYSTEMS | 2- 4 | 1 3/4 | - 1/8 | -6.6 |
| N | WYLY CORP | 2- 5 | 2 | 0 | 0.0 |

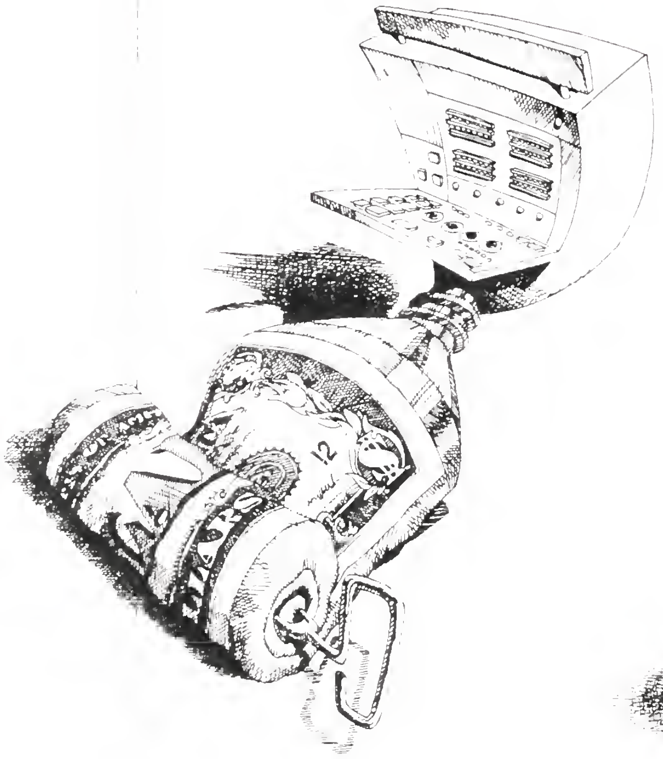
PERIPHERALS & SUBSYSTEMS

| EXCH | | PRICE 1974 RANGE (1) | CLOSE OCT 31 1974 | WEEK NET CHNGE | WEEK PCT CHNGE |
|---|---|---|---|---|---|
| N | ADDRESSOGRAPH-MULT | 4- 11 | 4 1/8 | 0 | 0.0 |
| O | ADVANCED MEMORY SYS | 1- 7 | 1 7/8 | + 1/2 | +36.3 |
| N | AMPEX CORP | 3- 5 | 3 1/4 | 0 | 0.0 |
| O | ANDERSON JACOBSON | 2- 4 | 1 3/4 | 0 | 0.0 |
| O | BEEHIVE MEDICAL ELEC | 2- 7 | 2 7/8 | 0 | 0.0 |
| A | BOLT.BERANEK & NEW | 5- 9 | 5 3/4 | + 3/8 | +6.9 |
| N | BUNKER-RAMO | 4- 8 | 4 3/4 | 0 | 0.0 |
| A | CALCOMP | 5- 11 | 5 7/8 | - 1/8 | -2.0 |
| O | CAMBRIDGE MEMORIES | 4- 16 | 6 1/2 | + 3/8 | +6.1 |
| O | CENTRONICS DATA COMP | 7- 23 | 9 3/4 | - 1/2 | -4.8 |
| O | CODEX CORP | 8- 15 | 13 3/4 | +1 | +7.8 |
| O | COGNITRONICS | 1- 2 | 5/8 | + 1/4 | +66.6 |
| O | COMPUTER COMMUN. | 1- 2 | 3/8 | 0 | 0.0 |
| A | COMPUTER EQUIPMENT | 1- 2 | 1 1/8 | 0 | 0.0 |
| O | COMPUTER MACHINERY | 1- 4 | 1 1/2 | - 1/8 | -7.6 |
| O | COMPUTER TRANSCEIVER | 1- 2 | 7/8 | 0 | 0.0 |
| N | CONRAC CORP | 10- 22 | 11 7/8 | 0 | 0.0 |
| O | DATA ACCESS SYSTEMS | 2- 3 | 2 1/2 | 0 | 0.0 |
| O | DATA 100 | 5- 13 | 6 3/4 | + 1/2 | +8.0 |
| A | DATA PRODUCTS CORP | 3- 4 | 2 3/4 | - 1/4 | -8.3 |
| O | DATA RECOGNITION | 1- 1 | 1/4 | 0 | 0.0 |
| O | DATA TECHNOLOGY | 2- 4 | 1 7/8 | 0 | 0.0 |
| O | DECISION DATA COMPUT | 3- 13 | 3 5/8 | - 3/8 | -9.3 |
| O | DELTA DATA SYSTEMS | 1- 2 | 5/8 | 0 | 0.0 |
| O | DITZAN CONTROLS | 1- 2 | 1/2 | 0 | 0.0 |
| N | ELECTRONIC M & M | 2- 4 | 1 5/8 | + 1/8 | +8.3 |
| O | FABRI-TEK | 1- 3 | 3/4 | 0 | 0.0 |
| O | GENERAL COMPUTER SYS | 1- 4 | 2 1/4 | - 1/4 | -10.0 |
| N | GENERAL ELECTRIC | 30- 65 | 38 1/4 | +2 3/4 | +7.7 |
| N | HAZELTINE CORP | 3- 7 | 3 | 0 | 0.0 |
| O | INFOREX INC | 2- 5 | 2 1/4 | 0 | 0.0 |
| O | INFORMATION DISPLAYS | 1- 1 | 1/8 | 0 | 0.0 |
| O | INFORMATION INTL INC | 6- 14 | 6 | 0 | 0.0 |
| A | LUNDY ELECTRONICS | 3- 3 | 2 7/8 | 0 | 0.0 |
| O | MANAGEMENT ASSIST | 1- 1 | 1/8 | 0 | 0.0 |
| N | MEMOREX | 2- 5 | 2 5/8 | + 1/8 | +5.0 |
| A | MILGO ELECTRONICS | 6- 18 | 8 | - 1/2 | -5.8 |
| N | MOHAWK DATA SCI | 1- 4 | 1 5/8 | 0 | 0.0 |
| O | O.E.C. COMPUTER SYST. | 1- 3 | 1 | 0 | 0.0 |
| O | OPTICAL SCANNING | 3- 6 | 2 3/4 | 0 | 0.0 |
| O | PERTEC CORP | 2- 6 | 2 1/4 | 0 | 0.0 |
| A | POTTER INSTRUMENT | 1- 5 | 1 7/8 | - 1/8 | -6.2 |
| O | PRECISION INST. | 1- 3 | 3/4 | 0 | 0.0 |
| O | QUANTOR CORP | 2- 8 | 3 1/2 | - 3/4 | -17.6 |
| O | RECOGNITION EQUIP | 2- 5 | 2 5/8 | + 1/4 | +10.5 |
| N | SANDERS ASSOCIATES | 2- 8 | 2 7/8 | 0 | 0.0 |
| O | SCAN DATA | 1- 2 | 7/8 | 0 | 0.0 |
| O | STORAGE TECHNOLOGY | 7- 15 | 8 3/4 | + 1/2 | +6.0 |
| O | SYCOR INC | 4- 13 | 6 1/2 | - 1/4 | -3.7 |
| O | TALLY CORP. | 2- 4 | 1 3/4 | - 1/8 | -6.6 |
| O | TEC INC | 2- 7 | 2 1/2 | 0 | 0.0 |
| N | TEKTRONIX INC | 22- 46 | 22 3/4 | -3 | -11.6 |
| N | TELEX | 3- 4 | 3 1/8 | 0 | 0.0 |
| O | WANGCO INC | 5- 13 | 5 1/8 | - 1/2 | -8.8 |
| O | WILTEK INC | 2- 4 | 1 3/4 | 0 | 0.0 |

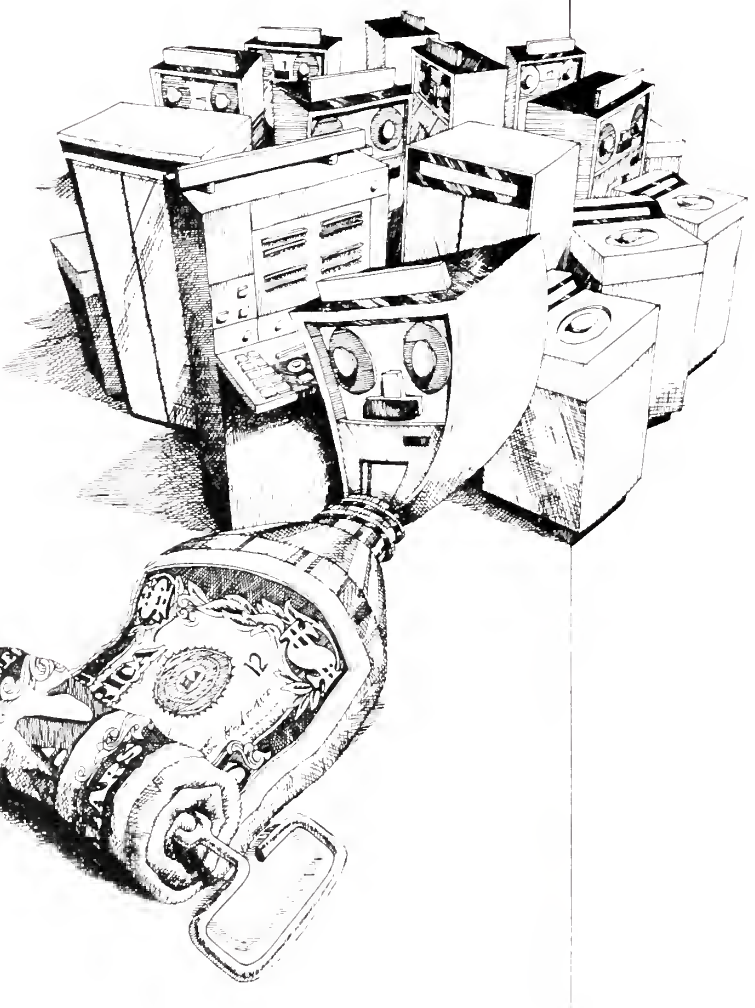
SUPPLIES & ACCESSORIES

| EXCH | | PRICE 1974 RANGE (1) | CLOSE OCT 31 1974 | WEEK NET CHNGE | WEEK PCT CHNGE |
|---|---|---|---|---|---|
| O | BALTIMORE BUS FORMS | 4- 6 | 4 3/4 | 0 | 0.0 |
| A | BARRY WRIGHT | 4- 7 | 4 3/4 | 0 | 0.0 |
| O | CYBERMATICS INC | 1- 2 | 1/2 | 0 | 0.0 |
| A | DATA DOCUMENTS | 23- 54 | 33 7/8 | +3 | +9.7 |
| O | DUPLEX PRODUCTS INC | 6- 17 | 12 7/8 | +1 1/4 | +9.9 |
| N | ENNIS BUS. FORMS | 4- 7 | 5 1/8 | + 5/8 | +13.8 |
| O | GRAHAM MAGNETICS | 6- 11 | 7 | - 1/2 | -6.6 |
| O | GRAPHIC CONTROLS | 6- 11 | 9 1/4 | +1 3/4 | +23.3 |
| N | 3M COMPANY | 47- 79 | 61 5/8 | +4 1/8 | +7.1 |
| O | MOORE CORP LTD | 33- 57 | 34 1/2 | + 1/4 | +0.6 |
| N | NASHUA CORP | 24- 45 | 28 | 0 | 0.0 |
| O | REYNOLDS & REYNOLDS | 8- 35 | 9 | 0 | 0.0 |
| O | STANDARD REGISTER | 10- 16 | 12 3/4 | + 1/2 | +4.0 |
| O | TAB PRODUCTS CO | 5- 11 | 6 | 0 | 0.0 |
| N | UARCO | 13- 23 | 17 1/2 | +1 3/8 | +8.5 |
| A | WABASH MAGNETICS | 3- 7 | 3 3/4 | + 1/8 | +3.4 |
| N | WALLACE BUS FORMS | 14- 24 | 15 1/4 | + 3/8 | +2.5 |

$51,238
per month
rental



$48,406
per month
lease



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